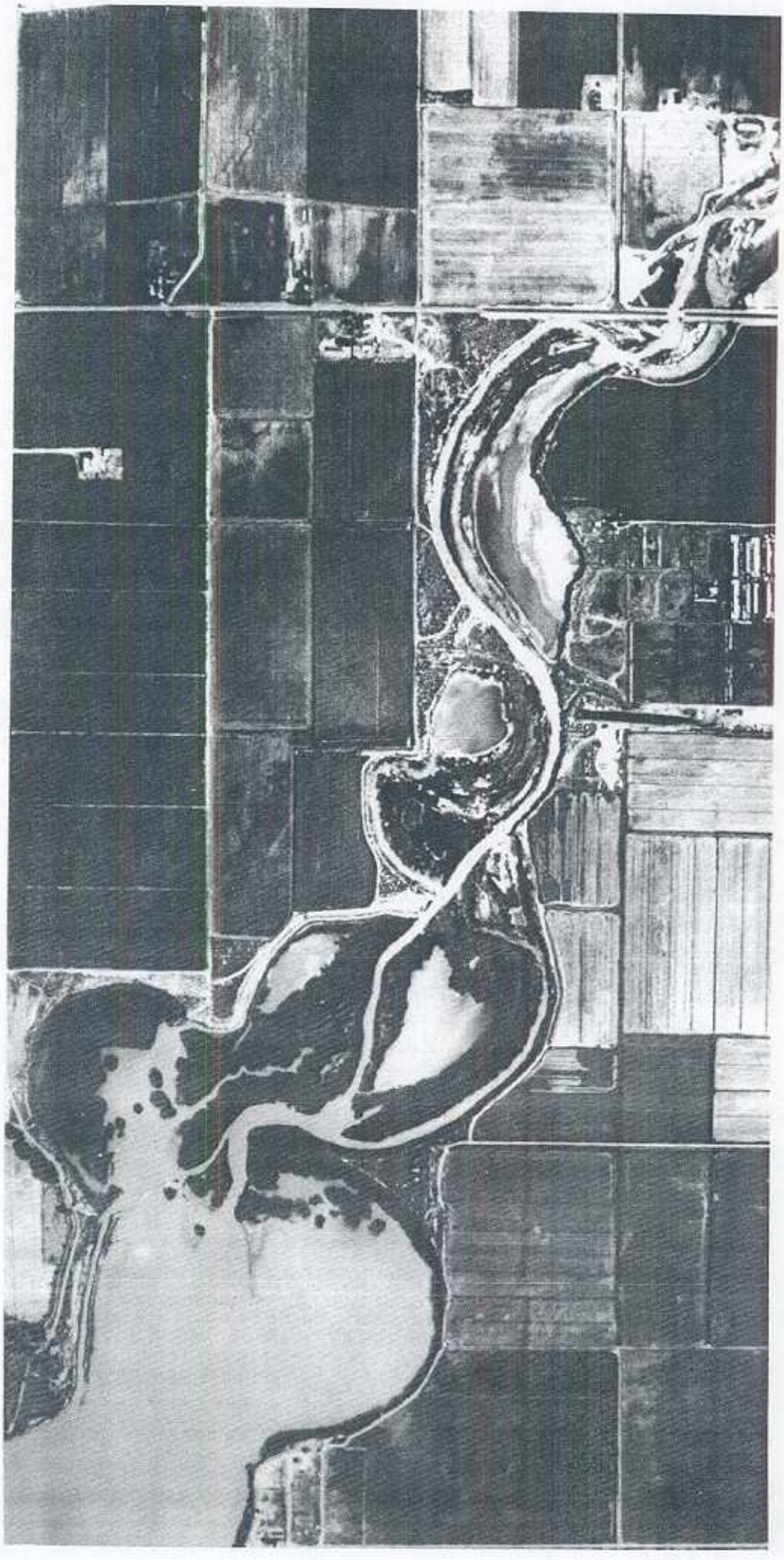

Water-Related Land Use Inventories

Utah

Utah Lake Study Area

UTAH
NATURAL RESOURCES
Water Resources

A WATER-RELATED LAND USE INVENTORY REPORT of the UTAH LAKE STUDY AREA

Aerial Photography and Field Mapping
Conducted in 1988

Prepared by

Utah Department of Natural Resources
Division of Water Resources

May 1993

ACKNOWLEDGEMENTS

This land use inventory report was conducted under the direction of Paul L. Gillette, deputy director, and supervised by Lloyd H. Austin, chief, Resources Inventories and Special Studies Section, Utah State Division of Water Resources. Staff members assisting in the preparation of this report and/or in the data collection and analyses were Jim Stephens, Anne Lewis, Ajit Gill, Eric Klotz, Steve Richardson, Kara Hartman, Richard Tullis, Randy Staker and Lloyd Austin. George Pyper (United States Geological Survey) assisted in the field mapping and checking.

Appreciation is expressed to those who have provided time and effort to acquire data and information for this inventory.

D. Larry Anderson

D. Larry Anderson, Director

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SUMMARY

This Water-Related Land Use Inventory Report of the Utah Lake Study Area is another in a series of land use reports prepared by the Division of Water Resources from data collected under its water-related land use inventory program. The land use inventory program of the division was set up to provide the land use data needed in the preparation of water budgets, hydrologic inventory reports and other state water planning activities. The division has collected land use data since 1966.

The water-related land use data for the Utah Lake Study Area were collected in 1989 by the Division of Water Resources. The report displays the data by subarea (see Figures 5 through 22) and tabulates it by subarea and county in Tables 2 and 3, respectively. The tables are presented in this summary as Tables i and ii, respectfully.

The division inventoried over 368,840 acres of land in the Utah Lake Study Area. This represents only about 19 percent of the entire Study Area. Areas not inventoried are mainly rangeland and national forests. Of the inventoried acres, 166,394 were irrigated land (including land that was fallow, idle or sub-irrigated), 101,496 were wet/open water areas (including reservoirs), and 36,391 were residential/industrial areas (including farmsteads and rural housing).

In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are often not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this

Table i. Summary of land cover by subarea for the Upper Jordan River Study Area (acres).

Code	Cover	Salt Creek 04-01-001	No. Juab Valley 04-01-002	Dog Valley 04-01-003	Santaquin Cyn. 04-01-004	Payson Creek 04-01-005	Thistle 04-01-006	Diamond Fork 04-01-007	Spanish Fk. Cyn. 04-01-008	Hobble Creek 04-01-009
IA1a	Fruit	0	26	0	0	0	0	0	0	0
IA1e	Other Horticulture	0	6	0	0	0	23	0	0	0
IA2a	Grain	0	2,946	0	0	0	519	0	0	0
IA2a1	Corn	0	698	0	0	0	0	0	0	0
IA2b	Vegetables	0	66	0	0	0	0	0	0	0
IA2b1	Potatoes	0	0	0	0	0	0	0	0	0
IA2b2	Onions	0	0	0	0	0	0	0	0	0
IA2b3	Beans	0	0	0	0	0	0	0	0	0
IA2c	Other Row Crops	0	0	0	0	0	0	0	0	0
IA3a	Alfalfa	0	6,416	0	0	0	797	0	85	0
IA3b	Grass Hay	0	563	0	0	0	1,745	0	0	0
IA3c	Grass/Turf	0	0	0	0	0	0	0	0	0
IA3d	Pasture	0	3,268	0	0	0	1,437	0	258	11
IA4a	Fallow	0	1,110	0	0	0	8	0	0	0
IA4b	Idle Overgrown	0	1,460	0	0	0	121	0	0	0
IIA1a	Pasture (surf. & sub.)	0	179	0	0	0	34	0	0	0
IIA1b	Grass Hay (surf. & sub.)	0	0	0	0	0	0	0	0	0
Surface Irr. Cropland Subtotal		0	16,738	0	0	0	4,684	0	343	11
IIA2a	Sub. Irr. Pasture	0	1,111	0	0	0	0	0	0	173
IIA2b	Sub. Irr. Grass Hay	0	661	0	0	0	0	0	5	0
Sub. Irr. Cropland Subtotal		0	1,772	0	0	0	0	0	5	173
Irrigated Croplands Subtotal		0	18,510	0	0	0	4,684	0	348	184
IIB	Cattail/Bullrush Aspect	0	0	0	0	0	0	0	0	0
IIB-E	Wet/Vegetation Asp.	0	0	0	0	0	0	0	0	0
IIC	Wet Flats	0	0	0	0	0	0	0	0	0
IIE	Riparian	0	0	0	0	0	0	0	0	0
IIF	Open Water	0	1,233	0	0	0	244	0	31	0
IIF2	Reservoirs	0	0	0	0	0	26	33	87	0
IIF4a	Temporary Flooded	0	0	0	0	0	0	0	0	0
IIF4b	Sewage Lagoon	0	25	0	0	0	0	0	0	0
IIF4c	Evaporation Pond	0	114	0	0	0	0	0	0	0
Wet/Open Water Subtotal		0	1,372	0	0	0	270	33	118	0
VA	Farmsteads	0	338	0	0	0	51	0	0	0
VB	Residential	0	1,732	0	0	0	5	0	11	7
VB3	Open Spaces	0	80	0	0	0	0	0	0	0
VC	Commercial/Industrial	0	360	0	0	0	3	0	0	277
Residential/Industrial Subtotal		0	2,510	0	0	0	59	0	11	284
Land Use/Land Cover Totals		0	22,392	0	0	0	5,013	33	477	468

Table i. Continued.

Code	Cover	Provo/Uinta 04-01-010	Francis 04-01-011	Round Valley 04-01-012	Heber Valley 04-01-013	So. Fk. Provo 04-01-014	Lower Provo 04-01-015	Am. Fk. Cyn. 04-01-016	Cedar Valley 04-01-017	Utah Valley 04-01-018	Total
IA1a	Fruit	0	0	0	0	0	0	0	0	9,852	9,878
IA1e	Other Horticulture	0	0	0	0	0	0	0	0	82	111
IA2a	Grain	0	50	133	1,138	0	0	0	246	22,332	27,364
IA2a1	Corn	0	0	0	0	0	0	0	0	12,137	12,835
IA2b	Vegetables	0	0	0	79	0	0	0	0	200	345
IA2b1	Potatoes	0	0	0	0	0	0	0	0	16	16
IA2b2	Onions	0	0	0	0	0	0	0	0	0	0
IA2b3	Beans	0	0	0	0	0	0	0	0	0	0
IA2c	Other Row Crops	0	0	0	0	0	0	0	0	8	8
IA3a	Alfalfa	0	421	425	5,164	0	0	0	1,787	22,243	37,338
IA3b	Grass Hay	0	748	749	1,635	0	0	0	616	8,095	14,151
IA3c	Grass/Turf	0	0	0	16	0	0	0	446	201	663
IA3d	Pasture	0	2,293	1,083	4,790	0	0	0	830	20,907	34,877
IA4a	Fallow	0	9	74	154	0	0	0	859	3,588	5,802
IA4b	Idle Overgrown	0	256	353	631	0	0	0	544	8,952	12,317
IIA1a	Pasture (surf. & sub.)	0	0	359	2,740	0	0	0	0	182	3,494
IIA1b	Grass Hay (surf. & sub.)	0	0	0	723	0	0	0	0	64	787
Surface Irr. Cropland Subtotal		0	3,777	3,176	17,070	0	0	0	5,328	108,859	159,986
IIA2a	Sub. Irr. Pasture	0	251	0	3	0	0	0	29	3,587	5,154
IIA2b	Sub. Irr. Grass Hay	0	0	0	101	0	0	0	0	487	1,254
Sub. Irr. Cropland Subtotal		0	251	0	104	0	0	0	29	4,074	6,408
Irrigated Croplands Subtotal		0	4,028	3,176	17,174	0	0	0	5,357	112,933	166,394
IIB	Cattail/Bullrush Aspect	0	0	0	0	0	0	0	1,252	1,875	3,127
IIB-E	Wet/Vegetation Asp.	0	0	0	0	0	0	0	0	156	156
IIC	Wet Flats	0	0	0	0	0	0	0	0	3	3
IIE	Riparian	0	1,294	14	939	0	0	0	0	144	2,666
IIF	Open Water	0	0	2	2,706	0	0	0	310	90,997	95,394
IIF2	Reservoirs	0	0	0	0	0	0	0	0	0	0
IIF4a	Temporary Flooded	0	0	0	0	0	0	0	0	0	0
IIF4b	Sewage Lagoon	0	0	0	0	0	0	0	11	0	36
IIF4c	Evaporation Pond	0	0	0	0	0	0	0	0	0	114
Wet/Open Water Subtotal		0	1,294	16	3,645	0	0	0	1,573	93,175	101,496
VA	Farmsteads	0	56	21	449	0	0	0	216	2,197	3,328
VB	Residential	0	384	145	1,928	0	0	0	64	19,247	23,523
VB3	Open Spaces	0	3	6	7	0	0	0	0	1,006	1,102
VC	Commercial/Industrial	0	0	0	707	0	0	0	23	7,068	8,438
Residential/Industrial Subtotal		0	443	172	3,091	0	0	0	303	29,518	36,391
Land Use/Land Cover Totals		0	5,765	3,364	23,910	0	0	0	7,233	235,626	304,281

Table ii. Summary of land cover by county for the Upper Jordan River Study Area (acres).

Code	Cover	Juab Co.	SanPete Co.	Summit Co.	Utah Co.	Wasatch Co.	Co. Total
IA1a	Fruit	26	0	0	9,852	0	9,878
IA1e	Other Horticulture	6	23	0	82	0	111
IA2a	Grain	2,946	442	35	22,655	1,286	27,364
IA2a1	Corn	698	0	0	12,137	0	12,835
IA2b	Vegetables	66	0	0	200	79	345
IA2b1	Potatoes	0	0	0	16	0	16
IA2b2	Onions	0	0	0	0	0	0
IA2b3	Beans	0	0	0	0	0	0
IA2c	Other Row Crops	0	0	0	8	0	8
IA3a	Alfalfa	6,416	588	217	24,324	5,793	37,338
IA3b	Grass Hay	563	1,245	659	9,211	2,473	14,151
IA3c	Grass/Turf	0	0	0	647	16	663
IA3d	Pasture	3,268	497	1,491	22,946	6,675	34,877
IA4a	Fallow	1,110	8	0	4,447	237	5,802
IA4b	Idle Overgrown	1,460	84	256	9,533	984	12,317
IIA1a	Pasture (surf. & sub.)	179	34	0	182	3,099	3,494
IIA1b	Grass Hay (surf. & sub.)	0	0	0	64	723	787
Surface Irr. Cropland Subtotal		16,738	2,921	2,658	116,304	21,365	159,986
IIA2a	Sub. Irr. Pasture	1,111	0	251	3,789	3	5,154
IIA2b	Sub. Irr. Grass Hay	661	0	0	492	101	1,254
Sub. Irr. Cropland Subtotal		1,772	0	251	4,281	104	6,408
Irrigated Croplands Subtotal		18,510	2,921	2,909	120,585	21,469	166,394
IIB	Cattail/Bullrush Aspect	0	0	0	3,127	0	3,127
IIB-E	Wet/Vegetation Asp.	0	0	0	156	0	156
IIC	Wet Flats	0	0	0	3	0	3
IIE	Riparian	0	0	710	419	1,537	2,666
IIF	Open Water	1,233	5	0	91,448	2,708	95,394
IIF2	Reservoirs	0	0	0	0	0	0
IIF4a	Temporary Flooded	0	0	0	0	0	0
IIF4b	Sewage Lagoon	25	0	0	11	0	36
IIF4c	Evaporation Pond	114	0	0	0	0	114
Wet/Open Water Subtotal		1,372	5	710	95,164	4,245	101,496
VA	Farmsteads	338	24	31	2,440	495	3,328
VB	Residential	1,732	5	323	19,329	2,134	23,523
VB3	Open Spaces	80	0	3	1,006	13	1,102
VC	Commercial/Industrial	360	0	0	7,371	707	8,438
Residential/Industrial Subtotal		2,510	29	357	30,146	3,349	36,391
Land Use/Land Cover Totals		22,392	2,955	3,976	245,895	29,063	304,281

category in the basin. Dry land agriculture (grain, beans, safflowers, etc.) represents only a small part of the total agriculture in this area of the state. The division mapped 46,098 acres under dry land agriculture in the Utah Lake Study Area.

This report also discusses the Division of Water Resources previous and present methodology of collecting and processing water-related land use data. It discusses the various land use classification codes used in past studies, and what is now considered the Standard Land Use Codes, which the division adopted in 1988 for all land use/land cover studies.

The information should be valuable to a variety of users, including county and city planners, state and federal agencies and private land owners. The division will use the data in water budget reports and in state water planning reports.

INTRODUCTION

The Division of Water Resources has been charged by the Utah State Legislature with the responsibility of developing a state water plan. This plan would coordinate and give direction to the activities of state and federal agencies concerned with Utah's water resources. To accomplish this objective, an assessment of the land use and available water resources is being made on a continuing basis. As a basis for planning and further development, the state has been divided into 11 natural drainage basins or study units shown in Figure 1. The South and East Colorado River Basin (originally designated basin No. 9) has been divided into the Southeast Colorado River Basin (retaining designation No. 9) and the Kanab Creek/Virgin River Basin (Lower Colorado River Basin), which is now basin No. 10.

While land use inventories contain information on land use in the state, water budget reports contain climate, hydrologic, and general information on the water resources within specific basins or study units. The water budgets provide an accounting of water inflow, outflow, yield, storage, evaporation, transpiration and uses in the study area. Hydrologic inventories and water budget reports currently published by the division are listed in Appendix A.

A major consideration in preparing water budgets is the quantity of water depleted through evaporation and transpiration. Estimates of these depletions are obtained by preparing water budgets from data gathered in the water-related land use inventories. This data includes the kinds and extent of irrigated crops, as well as similar information on phreatophytes, wet/open water areas and residential/industrial areas. Since 1966, the division has conducted water-related land use and hydrologic inventories in conjunction with other state water planning activities.

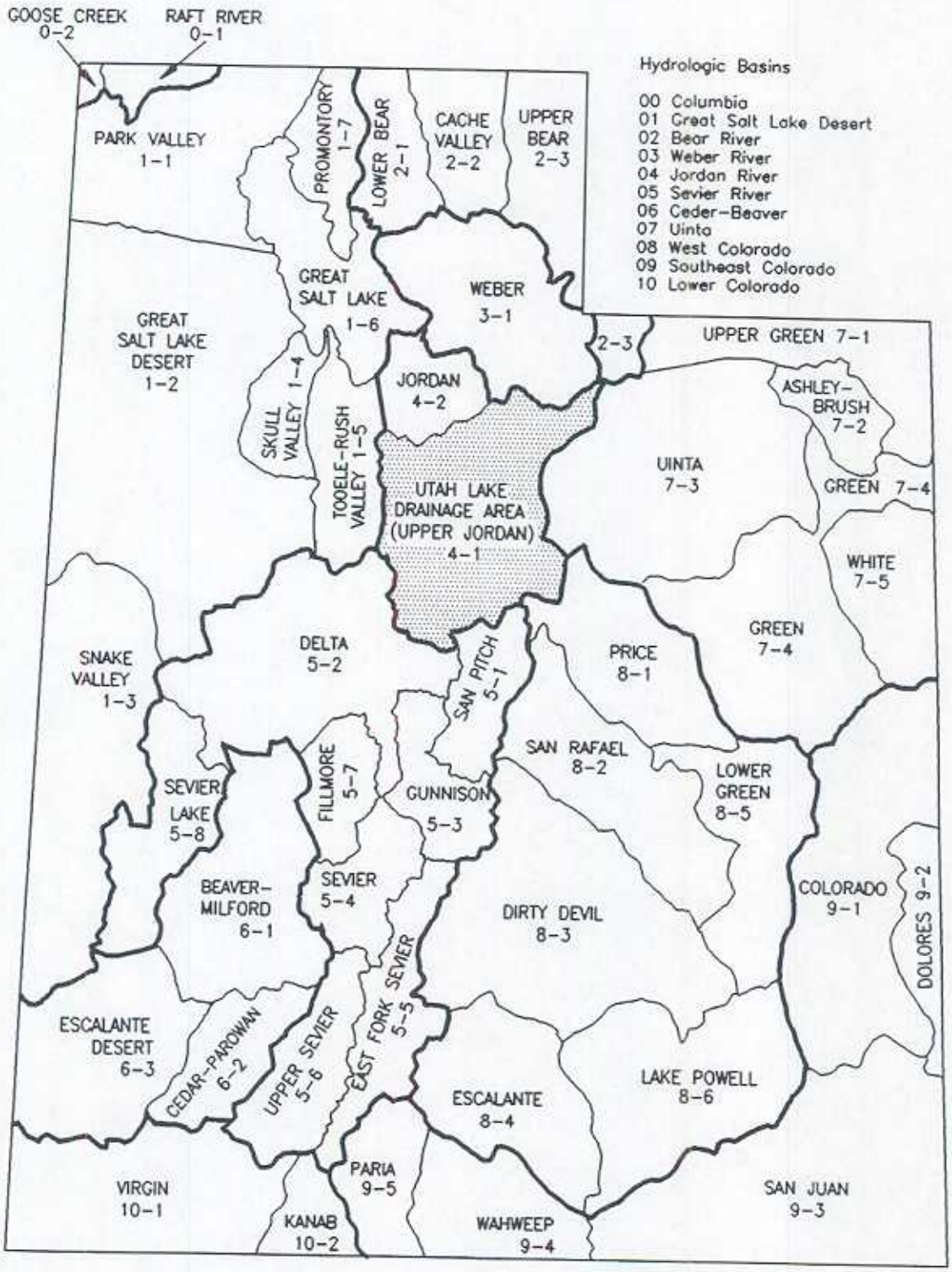


Figure 1. State of Utah hydrologic study areas with the Utah Lake Study Area highlighted.

This land use report should assist in promoting the coordinated and orderly development, conservation, use and management of water and land resources in the Utah Lake Study Area.

UTAH LAKE STUDY AREA WATER-RELATED LAND USE INVENTORY

The Utah Lake Water-Related Land Use Inventory study area was shown in Figure 1. Figure 2 shows the Utah Lake Study Area divided into separate hydrologic subareas. The study unit consists of approximately 3,039 square miles of land and includes Utah County and a small parts of Wasatch, Summit, Juab and San Pete Counties. Figure 3 shows the Utah Lake Study Area overlaid with a template showing the 7-1/2 min. USGS quadrangle maps used in the inventory. The state Automated Geographic Reference Center's (AGRC) reference numbers are cross-referenced with the division's reference number and the quadrangle name.

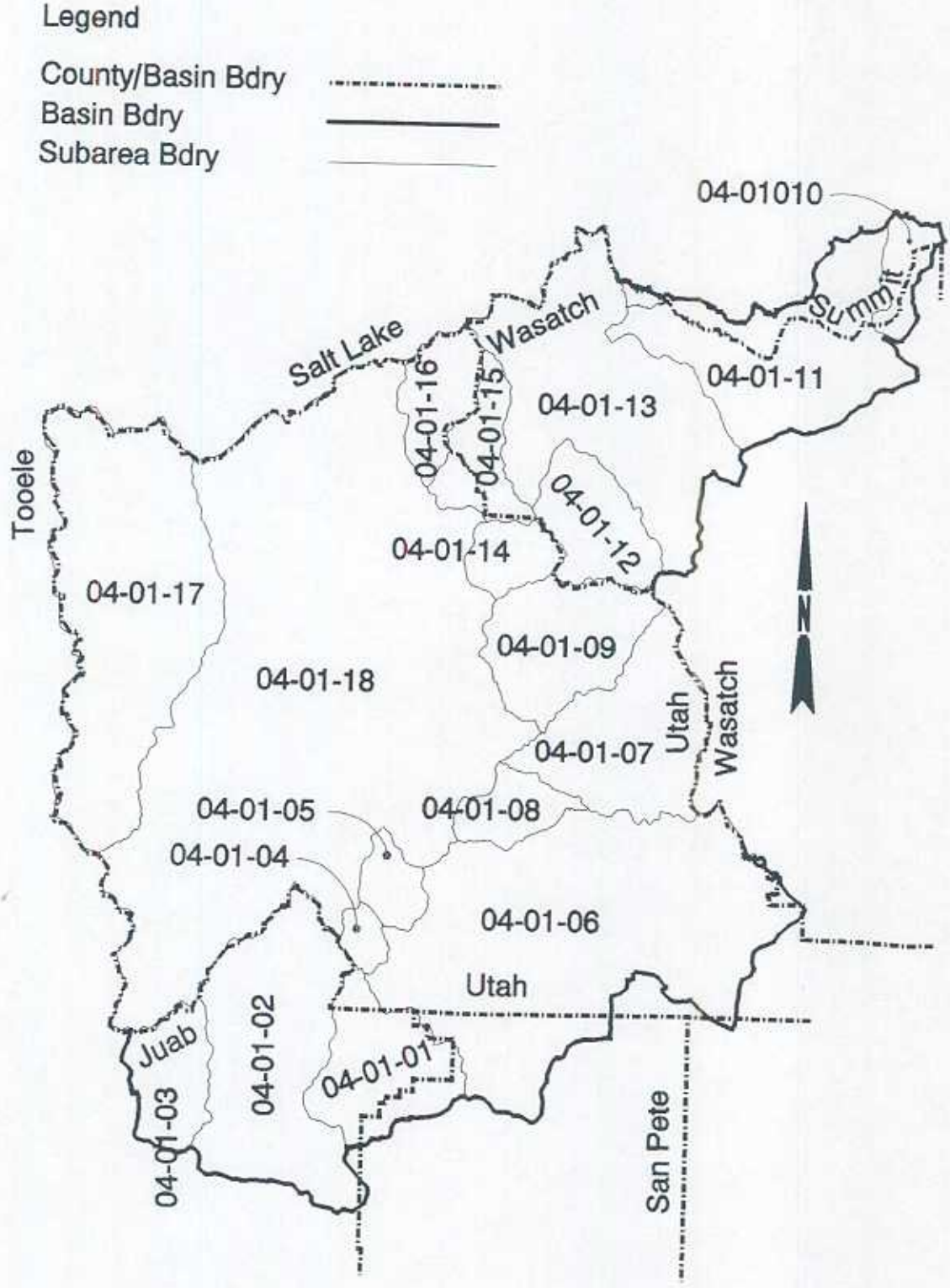


Figure 2. Hydrologic subareas of the Utah Lake Study Area.

List of 7-1/2 Minute Quadrangles for Figure 3.

List No.	Quadrangle Name	AGRC No.	DWR No.	List No.	Quadrangle Name	AGRC No.	DWR No.
1	Park City East	1323	F-21	39	Strawberry Res. N.W.	1725	F-55
2	Erickson Basin	1326	F-24	40	Boulter Peak	1817	E-63
3	Mirror Lake	1327	G-17	41	Allens Ranch	1818	E-64
4	Draper	1420	F-26	42	Goshen Valley North	1819	F-57
5	Dromedary Peak	1421	F-27	43	West Mountain	1820	F-58
6	Brighton	1422	F-28	44	Spanish Fork	1821	F-59
7	Heber City	1423	F-29	45	Spanish Fork Peak	1822	F-60
8	Francis	1424	F-30	46	Billies Mountain	1823	F-61
9	Woodland	1425	F-31	47	Rays Valley	1824	F-62
10	Soapstone Basin	1426	F-32	48	Strawberry Res. S.W.	1825	F-63
11	Iron Mine Mountain	1427	G-25	49	Tintic Junction	1917	J-7
12	Lowe Peak	1517	E-39	50	Eureka	1918	J-8
13	Tickville Spring	1518	E-40	51	Goshen	1919	K-1
14	Jordan Narrows	1519	F-33	52	Santaquin	1920	K-2
15	Lehi	1520	F-34	53	Payson Lakes	1921	K-3
16	Timpanogos Cave	1521	F-35	54	Birdseye	1922	K-4
17	Aspen Grove	1522	F-36	55	Thistle	1923	K-5
18	Charleston	1523	F-37	56	Mill Fork	1924	K-6
19	Center Creek	1524	F-38	57	Tucker	1925	K-7
20	Heber Mountain	1525	F-39	58	Soldiers Summit	1926	K-8
21	Wolf Creek Summit	1526	F-40	59	Tintic Mountain	2018	J-16
22	Mercur	1617	E-47	60	Slate Jack Canyon	2019	K-9
23	Cedar Fort	1618	E-48	61	Mona	2020	K-10
24	Saratoga Springs	1619	F-41	62	Nebo Basin	2021	K-11
25	Pelican Point	1620	F-42	63	Spenser Canyon	2022	K-12
26	Orem	1621	F-43	64	Indianola	2023	K-13
27	Bridal Veil Falls	1622	F-44	65	C Canyon	2024	K-14
28	Wallsburg Ridge	1623	F-45	66	Scofield Reservoir	2025	K-15
29	Twin Peaks	1624	F-46	67	Furner Ridge	2118	J-24
30	Co-op Creek	1625	F-47	68	Sugarloaf	2119	K-17
31	Five Mile Pass	1717	E-55	69	Nephi	2120	K-18
32	Goshen Pass	1718	E-56	70	Fountain Green No.	2121	K-19
33	Soldiers Pass	1719	F-49	71	Big Hollow	2122	K-20
34	Lincoln Point	1720	F-50	72	Fairview	2123	K-21
35	Provo	1721	F-51	73	Juab	2219	K-25
36	Springville	1722	F-52	74	Levan	2220	K-26
37	Granger Mountain	1723	F-53	75	Fountain Green So.	2221	K-27
38	Two Tom Hill	1724	F-54				

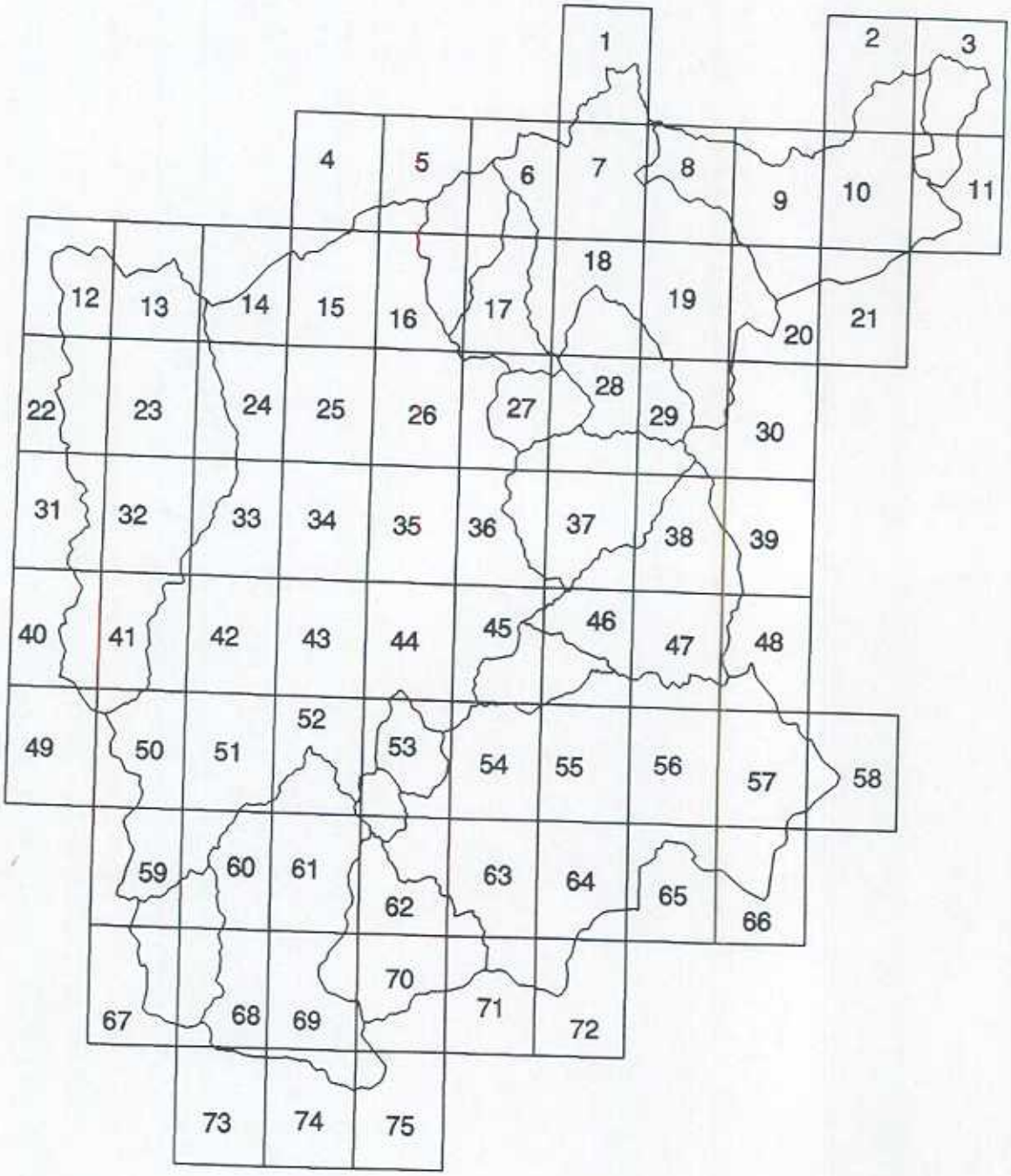


Figure 3. Utah Lake Study Area with hydrologic subarea boundaries overlaid by a template showing 7-1/2 minute USGS quadrangle maps.

OPERATIONS USED IN LAND USE DATA ACQUISITION

Aerial Photography

Aerial photography of the study area was conducted from June to August 1988. Mapping & Analytical Photographic Services Inc., Salt Lake City, Utah, photographed the study area using a turbo-charged Cessna TU-206 aircraft specially modified for aerial photography. An ARNAV R-40 Loran C navigation system kept the plane on line, while a Nikon F-3 35mm camera with 24mm lens in the photo well took the photos. All slides were taken on 35mm Ektachrome film and processed by Kodak labs. Slides were identified according to flight line number, cross-referenced on a special location map, and delivered to the division at different times between June and August 1988. The actual flight date was written on each slide frame by the division. Approximately 500 slides were delivered to the division covering the water-related land use in the study unit. These slides may be viewed at, or copies purchased from, the offices of the Division of Water Resources, Planning Section, 1636 West North Temple, Salt Lake City, Utah.

Field Mapping and Checking

Transferring information from 35mm slides to the field maps was accomplished between June and August, 1988. Slide cataloging, filing and mapping were done concurrently. Field checking and mapping was completed between July 10, and September 1, 1988. This process involved nine people from the Division of Water Resources and one from the U.S. Geological Survey.

Digitizing and Processing

The data resulting from digitizing the field maps was processed through the Utah State Automated Geographic Reference Center (AGRC) during the fall and winter of 1988-89. The Utah Lake Study Area data are maintained at both the AGRC and the Division of Water Resources. Maps and data can be obtained from the AGRC at the Office of Planning and Budget, State Office Building, Salt Lake City, Utah.

A draft map of the cropland cover types was printed for each 7-1/2 min. quad. map for the purpose of checking the data. Each map was laid over the corresponding field map on a light table, and the cropland types and boundaries were double-checked for accuracy. Any corrections or additions were marked in red on the draft map for future updating. The corrected maps were updated and stored on the AGRC system.

UTAH LAKE STUDY AREA LAND USE DATA

The list of cover types and codes used in the 1988 Water Related Land Use Inventory for the Utah Lake Study Area is shown in Table 1. This list was standardized in 1988 and is further discussed in the land use categories of this report. Figure 4 shows the general location of the water-related land use areas mapped in the Utah Lake Study Area. Figures 5 - 22 show the water-related land use for each hydrologic subarea. The explanation opposite each of these figures shows the land cover categories and the number of acres of land in each category.

Division policy is to publish its land use data in these types of reports. Detailed maps will not be included. With the establishment of the AGRC for the state of Utah, the division policy is to supply the land use data to them for further distribution. Detailed maps can be obtained from the AGRC.

Table 1. List of cover types and codes used in the 1988 Water-Related Land Use Inventory for the Utah Lake Study Area.

Code	Cover Type	Comments/Explanations
I	Cropland	(Rotation Crops)
IA	Irrigated Cropland	
IA1	Horticulture & Specialty Crops	
IA1a	Fruit	(Orchards)
IA1a1	Cherry	
IA1a2	Apple	
IA1a3	Peach	
IA1a4	Pear	
IA1a5	Apricot	
IA1a6	Other	
IA1b	Nuts	(Groves)
IA1b1	Walnut	
IA1b2	Pecan	
IA1b3	Other	
IA1c	Vineyard	(Grapes)
IA1d	Bush Fruit	
IA1e	Berries	
IA1f	Other Horticulture	(Nurseries)
IA1g	Other Specialty Crops	
IA2	Row and Close Grown Crops	
IA2a	Grain	
IA2a1	Corn	
IA2a2	Sorghum	
IA2a3	Wheat	
IA2a4	Barley	
IA2a5	Oats	
IA2a6	Other Grains	
IA2b	Vegetables	
IA2b1	Potatoes	
IA2b2	Onions	
IA2b3	Beans	
IA2b4	Tomatoes	
IA2b5	Sweet Corn	
IA2b6	Other	(Melons, Squash, Etc.)

Table 1. Continued.

Code	Cover Type	Comments/Explanations
IA3	Forage Crops	
IA3a	Alfalfa	
IA3b	Grass Hay	
IA3c	Grass/Turf	
IA3d	Pasture	(Turf Farms)
IA3e	Other	
IA4	Other	
IA4a	Fallow	(Plowed or disked.)
IA4b	Idle	(Overgrown more than one season.)
IB	Non-Irrigated Cropland	(Rotation Crops)
IB1	Row and Close-Grown Crops	
IB1a	Grain, Beans, Seeds	
IB1a1	Wheat	
IB1a2	Other Grains	(Barley, Etc.)
IB1a3	Dry Beans	
IB1a4	Safflower	
IB1a5	Other	
IB2	Hayland Crops	
IB2a	Alfalfa	
IB2b	Pasture	
IB2c	Other	
IB3	Other	
IB3a	Fallow	(Plowed, Stubble, Mulch)
IB3b	Idle	(Overgrown more than one season.)
II	Grassy/Phreato./Open Water Areas	
IIA	Grassy Aspect	
IIA2a	Irrigated	
IIA2a1	Pasture	(Subject to spring flooding.)
IIA2a2	Hayland	(Subject to spring flooding.)
IIA2b	Non-Irrigated	
IIA2b1	Pasture	(Receives subsurface water.)
IIA2b2	Hayland	(Receives subsurface water.)
IIA2c	Non-Agricultural Use	(Receives subsurface water.)
IIB	Cattail/Bulrush Aspect	

Table 1. Continued.

Code	Cover Type	Comments/Recommendations
IIC	Wet Flats	(Mud flats w/little or no vgttn.)
IID	Shrub Aspect	(Salt Brush, Sagebrush)
IIE	Riparian	
IIE1	Forested Aspect	(Cottonwoods, Birch)
IIE2	Shrub Aspect	(Willows)
IIF	Open Water	
IIF1	Streams	
IIF2	Reservoirs	(Man-Made)
IIF3	Ponds & Lakes	
IIF4	Other	
IIF4a	Temporary Flooded	
IIF4b	Sewage Lagoon	
IIF4c	Evaporation Pond	
III	Range Land and Forest Land	
IIIA	Alpine Plant Communities	
IIIB	Conifer	
IIIB1	Douglas Fir - White Fir	
IIIB2	Ponderosa Pine	
IIIB3	Fir - Spruce	
IIIB4	Lodgepole Pine	
IIIB5	Pinion Pine - Juniper	
IIIB6	Other	
IIIC	Deciduous	
IIIC1	Aspen	
IIIC2	Mountain Brush	(Oak Brush, Maples, Chaparral)
IIIC3	Other	
IIID	Grass Aspect	
IIID1	Dry Pastures - Improved	(Chained and reseeded)
IIID2	Native Grasses	
IIID3	Other	(Forbs)
IIIE	Shrub Aspect	
IIIE1	Northern Desert Shrub	
IIIE1a	Sagebrush	(Shadscale, Greasewood, Halogeton)

Table 1. Continued.

Code	Cover Type	Comments/Explanations
IIIE1b	Other	
IIIE2	Southern Desert Shrubs	
IIIE2a	Creosote Bush	
IIIE2b	Other	(Forbs, Annual Grasses)
IIIE3	Salt Desert Shrubs	
IIIE3a	Shascale	
IIIE3b	Greasewood	
IIIE3c	Saltbrush	
IIIE3d	Desert Molley	
IIIE3e	Other	(Halogeton)
IV	Barren Lands	
IVA	Bare Soil/Sand	
IVA1	Dry Salt Flats	
IVA2	Beaches	
IVA3	Sandy Areas Other Than Beaches	(Desert Sand Dunes)
IVA4	Other	
IVB	Rock Outcrops	
IVC	Excavated Lands	(Strip Mines, Quarries, Gravel Pits)
IVD	Other	
V	Built-Up Land	
VA	Farmsteads	
VA1	Buildings/Homes	
VA2	Open Spaces	(Feed Lots, Etc.)
VB	Residential	
VB1	Buildings/Homes	(High Density)
VB2	Buildings/Homes	(Low Density)
VB3	Open Spaces	(Parks, Golf Courses)
VB4	Idle Spaces	(Not Irrigated)
VC	Commercial/Industrial	
VC1	Commercial	
VC2	Industrial	
VC3	Open Spaces	
VD	Transportation, Communications, Utilities	
VE	Other	

Land Cover Area Summary for Figure 4.
Utah Lake Study Area.

State Code	Cover Type	Acres
IA1a	Fruit	9,989
IA2a	Grain	27,364
IA2a1	Corn	12,835
IA2b	Vegetables	345
IA2b1	Potatoes	16
IA2c	Other Row Crops	8
IA3a	Alfalfa	37,338
IA3b	Grass Hay	14,151
IA3C	Grass/Turf	663
IA3d	Pasture	34,877
IA4a	Fallow	5,802
IA4b	Idle	12,317
IB1a	Grain/Beans/Seesds (dry)	16,958[1]
IB2a	Alfalfa (dry)	1,418[1]
IB2b	Pasture (dry)	6,252[1]
IB3b	Fallow (dry)	12,689[1]
IB3c	Idle (dry)	8,781[1]
IIA1a	Pasture (surf & sub irr)	5,154
IIA2a	Pasture (sub irr)	1,254
IIB	Cattail/Bullrush Aspect	3,127
IIB-E	Wet/Vegetation Aspect	156
IIC	Wet Flats	3
IIE	Riparian	2,666
IIF	Open Water	95,394
IIF4b	Sewage Lagoon	36
IIF4c	Evaporation Pond	114
IVC	Excavated Lands	18,463
VA	Farmsteads	3,328
VB	Residential	23,523
VB3	Open Spaces	1,102
VC	Commercial/Industr.	8,438
		368,842

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the numbers of acres mapped, not the total numbers of acres in the subarea.

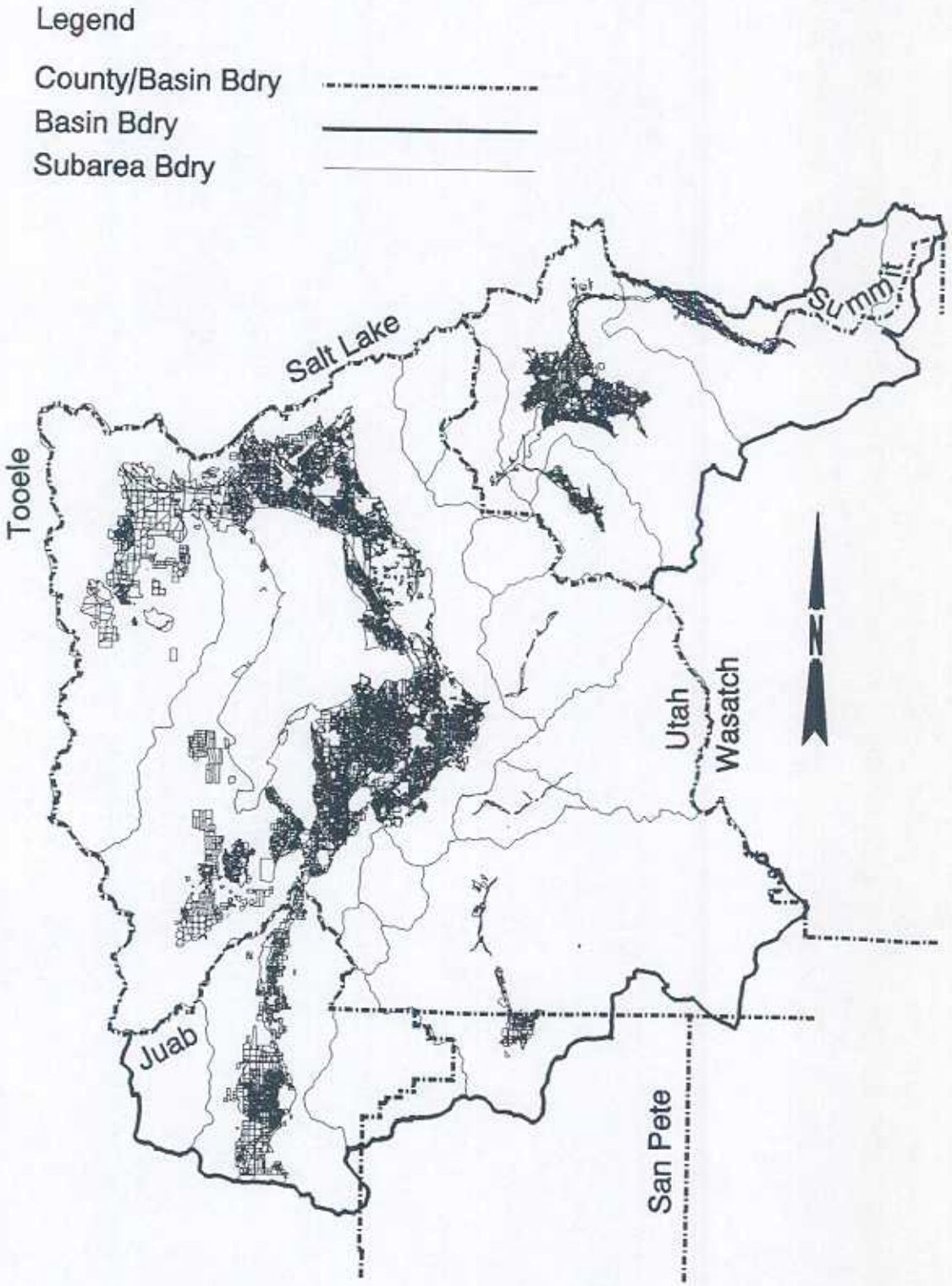


Figure 4. Water-related land use mapped areas for the Utah Lake Study Area.

Land Cover Area Summary for Figure 5.
Salt Creek (04-01-001) subarea.

Code	Land Cover	Acres
		0
		0

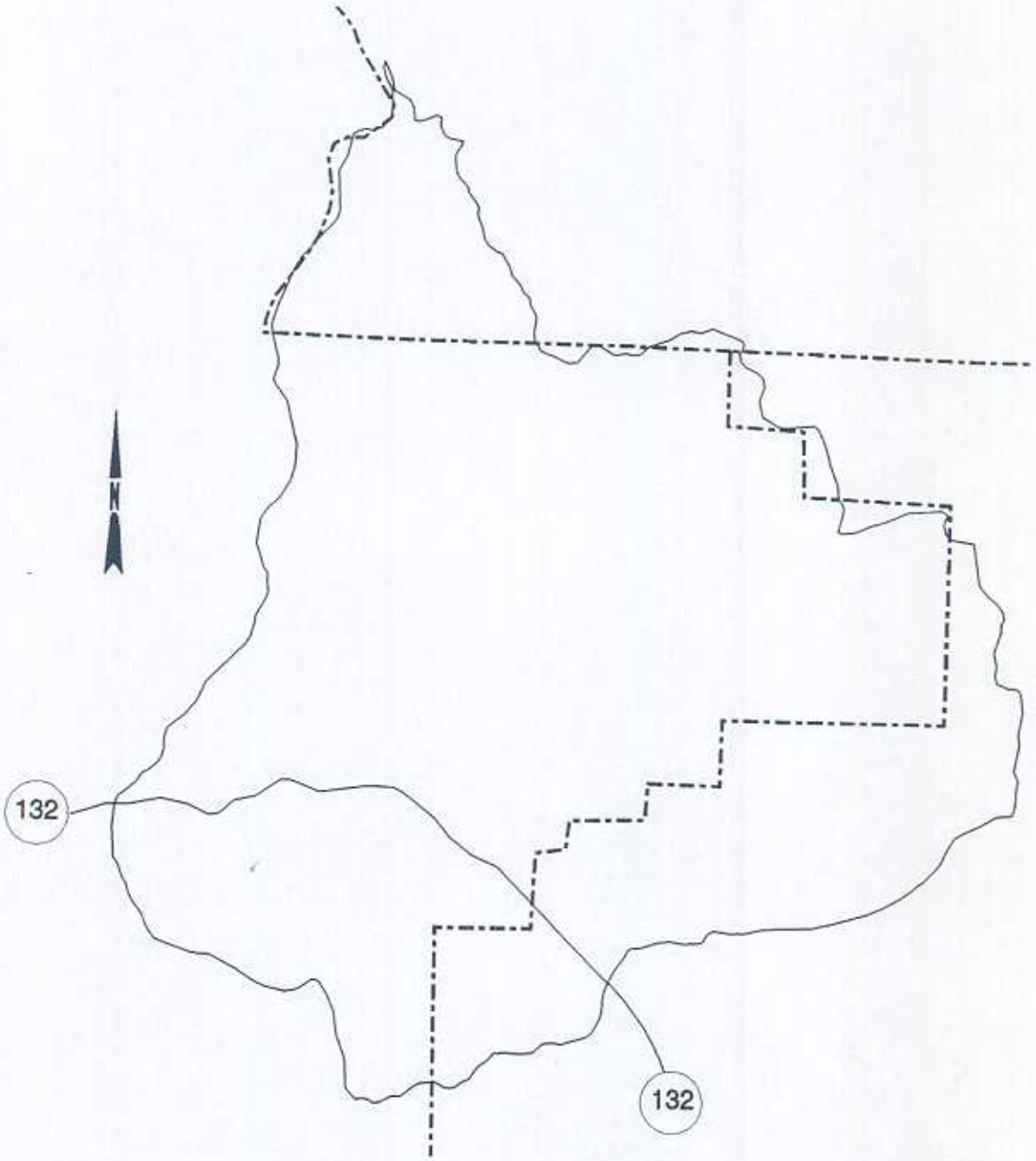


Figure 5. Water-related land use coverage of the Salt Creek (04-01-001) subarea.

Land Cover Area Summary for Figure 6.
North Juab Valley (04-01-002) subarea.

Code	Land Cover	Acres
IA1a	Fruit	26
IA1e	Other Horticulture	6
IA2a	Grain	2,946
IA2a1	Corn	698
IA2b	Vegetables	66
IA3a	Alfalfa	6,416
IA3b	Grass Hay	563
IA3d	Pasture	3,268
IA4a	Idle-Plowed	1,110
IA4b	Idle	1,460
IB1a	Grain/Beans/Seeds (dry)	848[1]
IB2a	Alfalfa (dry)	1,003[1]
IB2b	Pasture (dry)	1,451[1]
IB3a	Fallow (dry)	1,368[1]
IB3b	Idle (dry)	4,211[1]
IIA1a	Pasture (surf & sub irr)	179
IIA2a	Pasture (sub irr)	1,111
IIA2a	Grass Hay (sub irr)	661
IIF	Open Water	1,233
IIF4b	Sewage Lagoon	25
IIF4c	Evaporation Pond	114
VA1	Farmsteads	338
VB2	Blds/Homes (lo den)	1,732
VB3	Open Spaces	80
VC	Commercial	238
VC2	Industrial	122
		31,273

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.

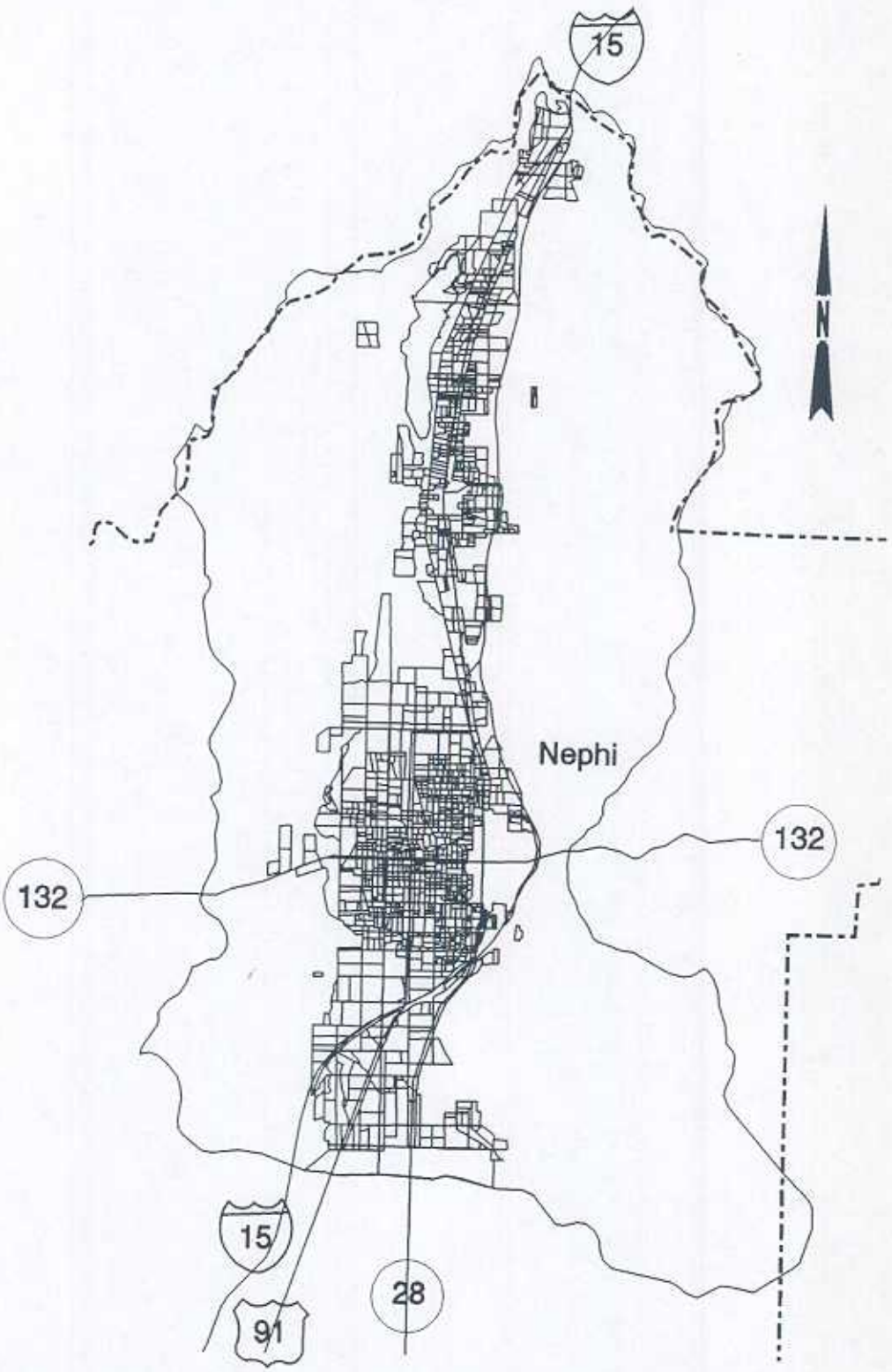


Figure 6. Water-related land use coverage of the North Juab Valley (04-01-002) subarea.

Land Cover Area Summary for Figure 7.
Dog Valley (04-01-003) subarea.

Code	Land Cover	Acres
		0
		0

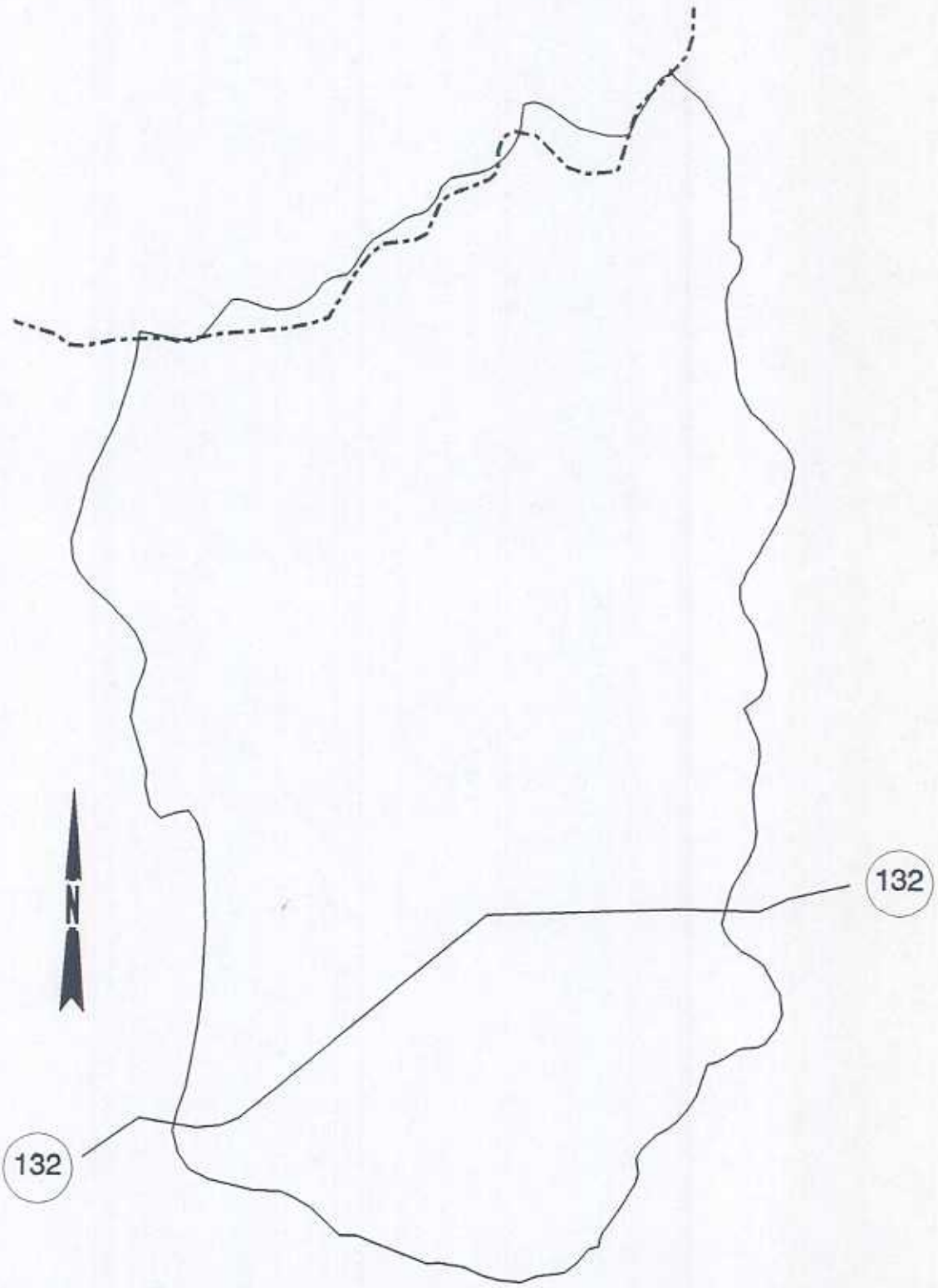


Figure 7. Water-related land use coverage of the Dog Valley (04-01-003) subarea.

Land Cover Area Summary for Figure 8.
Santaquin Canyon (04-01-004) subarea.

Code	Land Cover	Acres
		0
		0

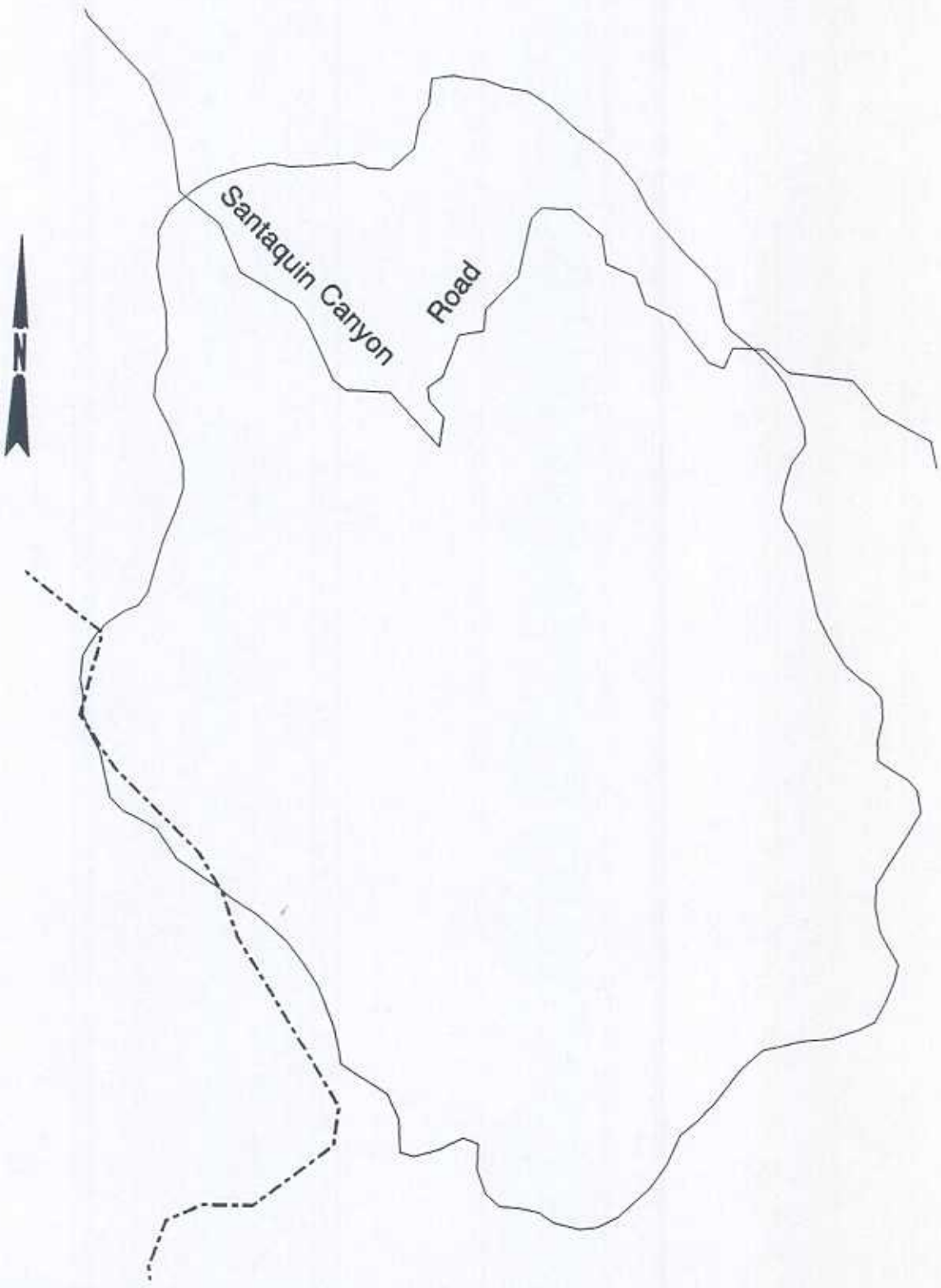


Figure 8. Water-related land use coverage of the Santaquin Canyon (04-01-004) subarea.

Land Cover Area Summary for Figure 9.
Payson Creek (04-01-005) subarea.

Code	Land Cover	Acres
		0
		0

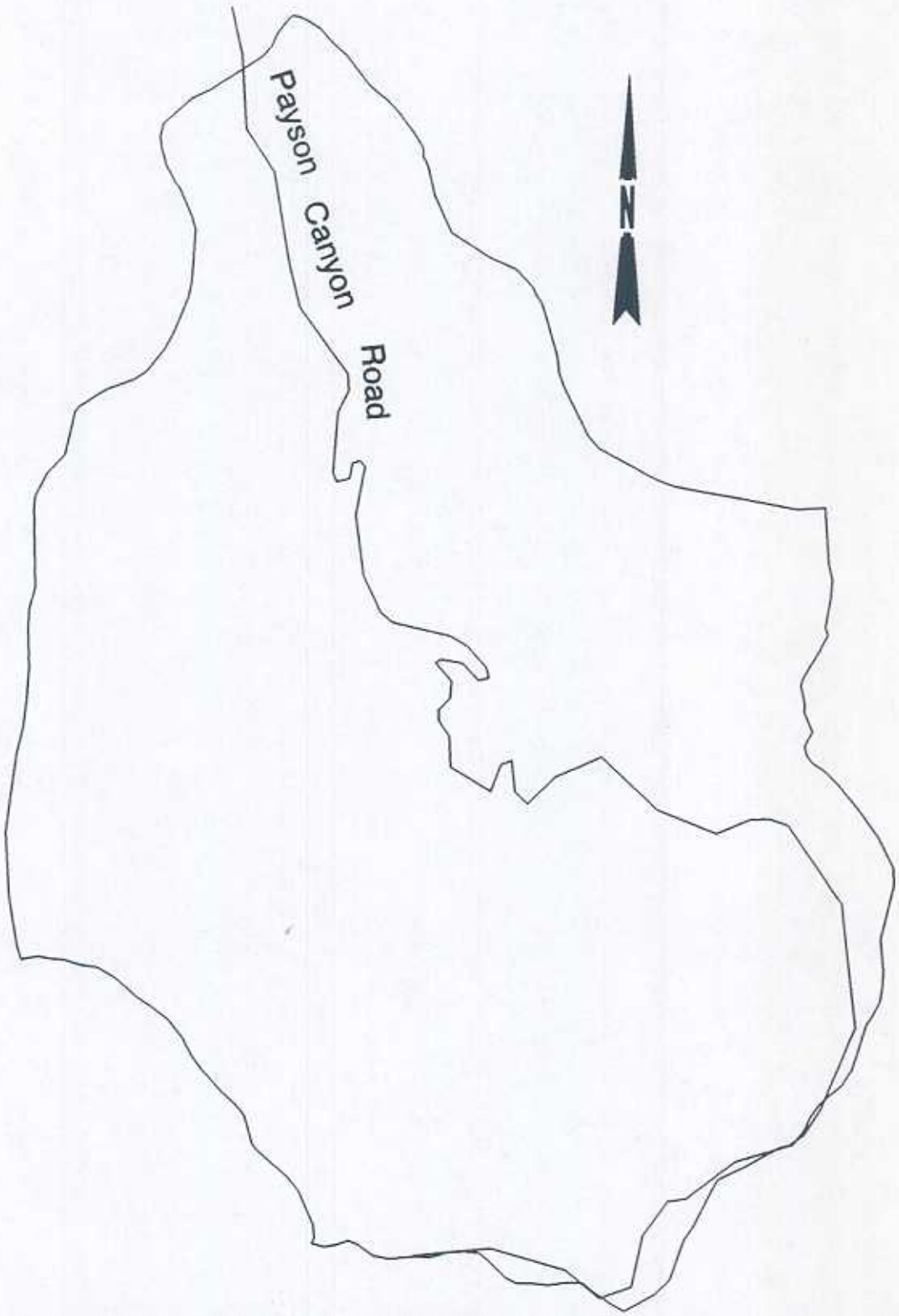


Figure 9. Water-related land use coverage of the Payson Creek (04-01-005) subarea.

Land Cover Area Summary for Figure 10.
Thistle (04-01-006) subarea.

Code	Land Cover	Acres
IA1e	Other Horticulture	23
IA2a	Grain	519
IA3a	Alfalfa	797
IA3b	Grass Hay	1,745
IA3d	Pasture	1,437
IA4a	Fallow	8
IA4b	Idle	121
IB2b	Pasture (dry)	502[1]
IIA1a	Pasture (surf & sub irr)	34
IIE	Riparian	244
IIF	Open Water	26
VA1	Farmsteads	51
VB2	Residential (lo den)	5
VC2	Industrial	3
		5,515

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.

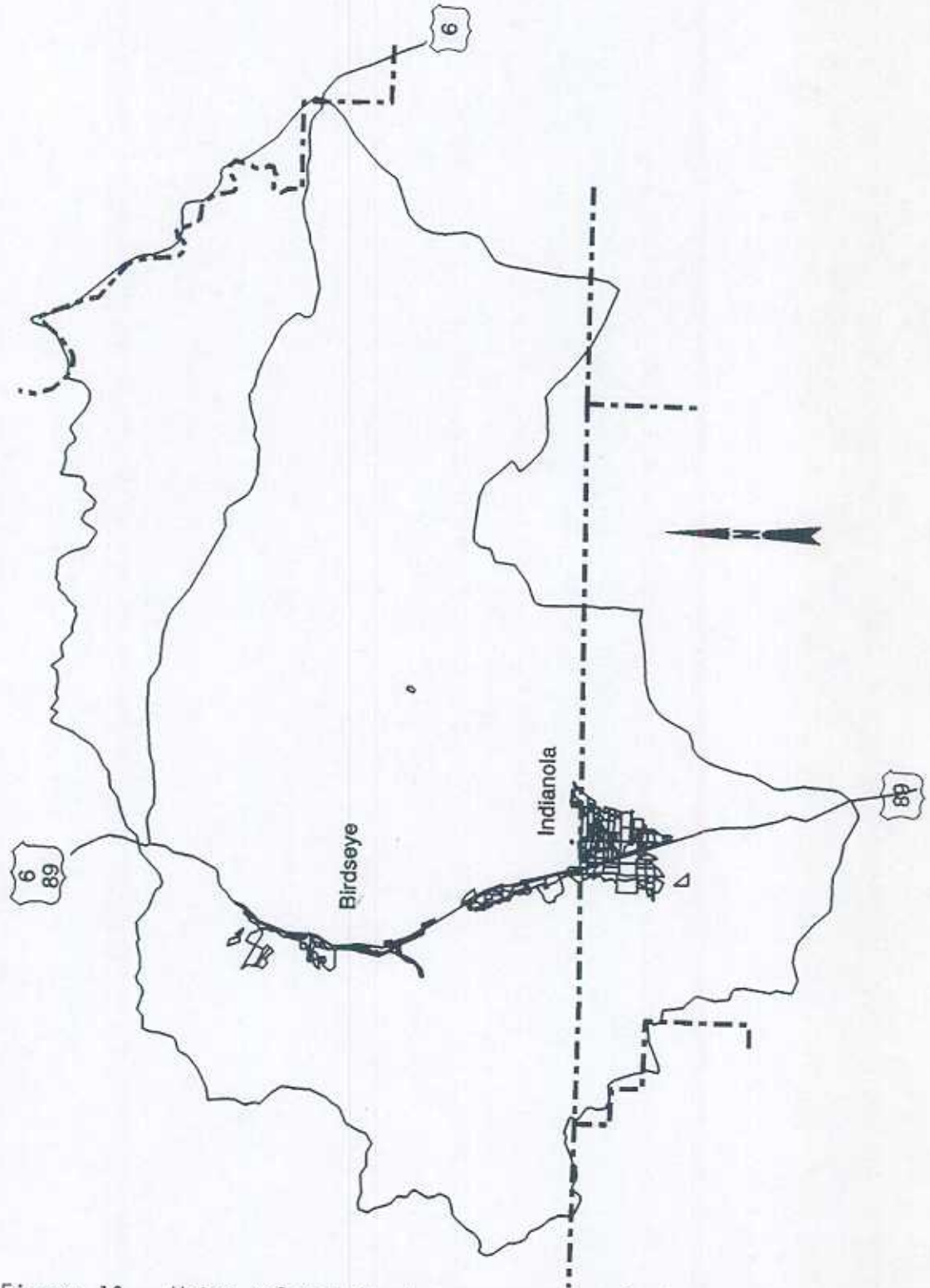


Figure 10. Water-related land use coverage of the Thistle (04-01-006) subarea.

Land Cover Area Summary for Figure 11.
Diamond Fork (04-01-007) subarea.

Code	Land Cover	Acres
IIF	Open Water	33
		33

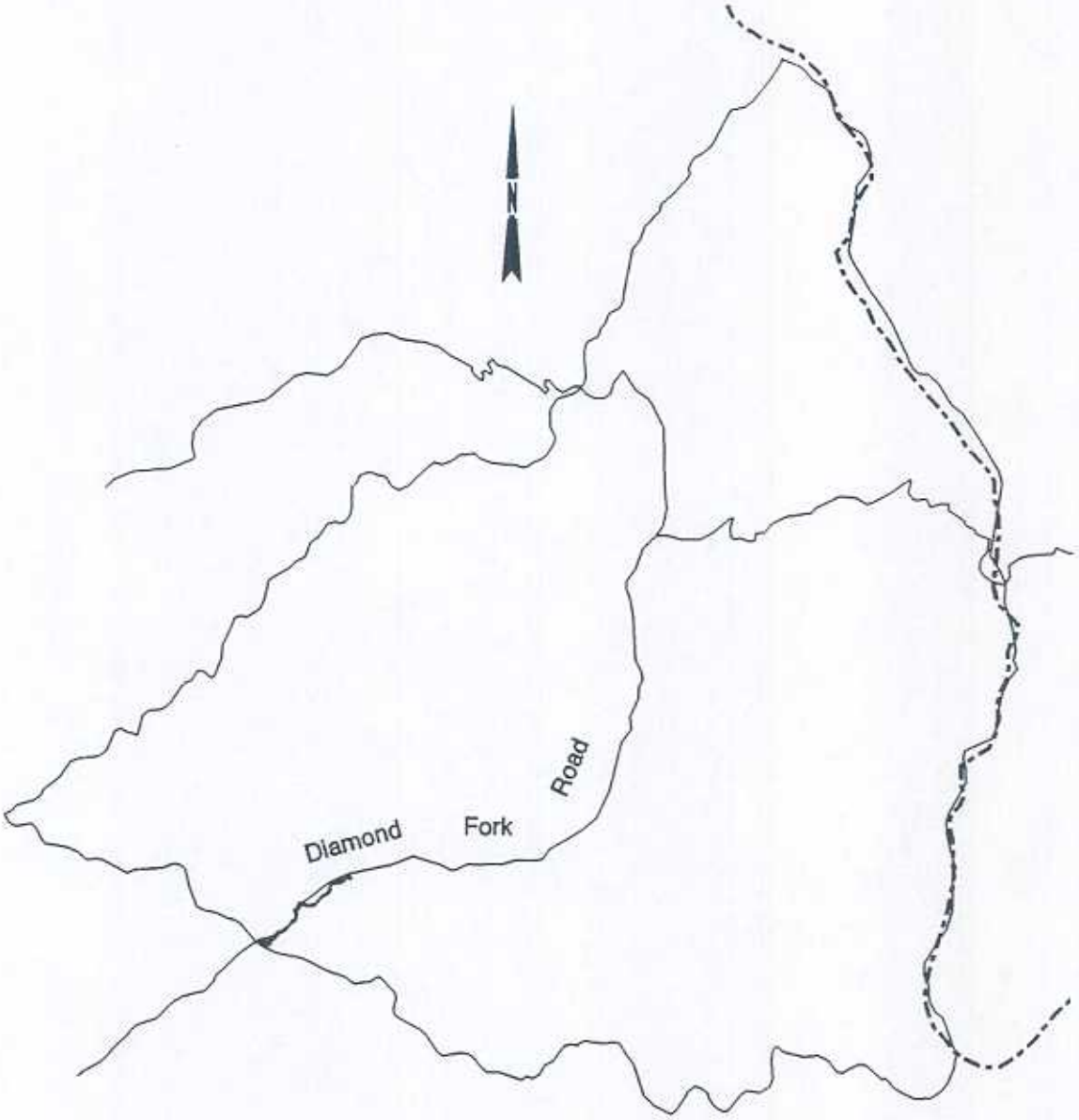


Figure 11. Water-related land use coverage of the Diamond Fork (04-01-007) subarea.

Land Cover Area Summary for Figure 12.
Spanish Fork Canyon (04-01-008) subarea.

Code	Land Cover		Acres
IA3a	Alfalfa		85
IA3d	Pasture		258
IIA2b	Grass Hay	(sub irr)	5
IIE	Riparian		31
IIF	Open Water		87
VB2	Bldgs/Homes	(lo den)	11
			477

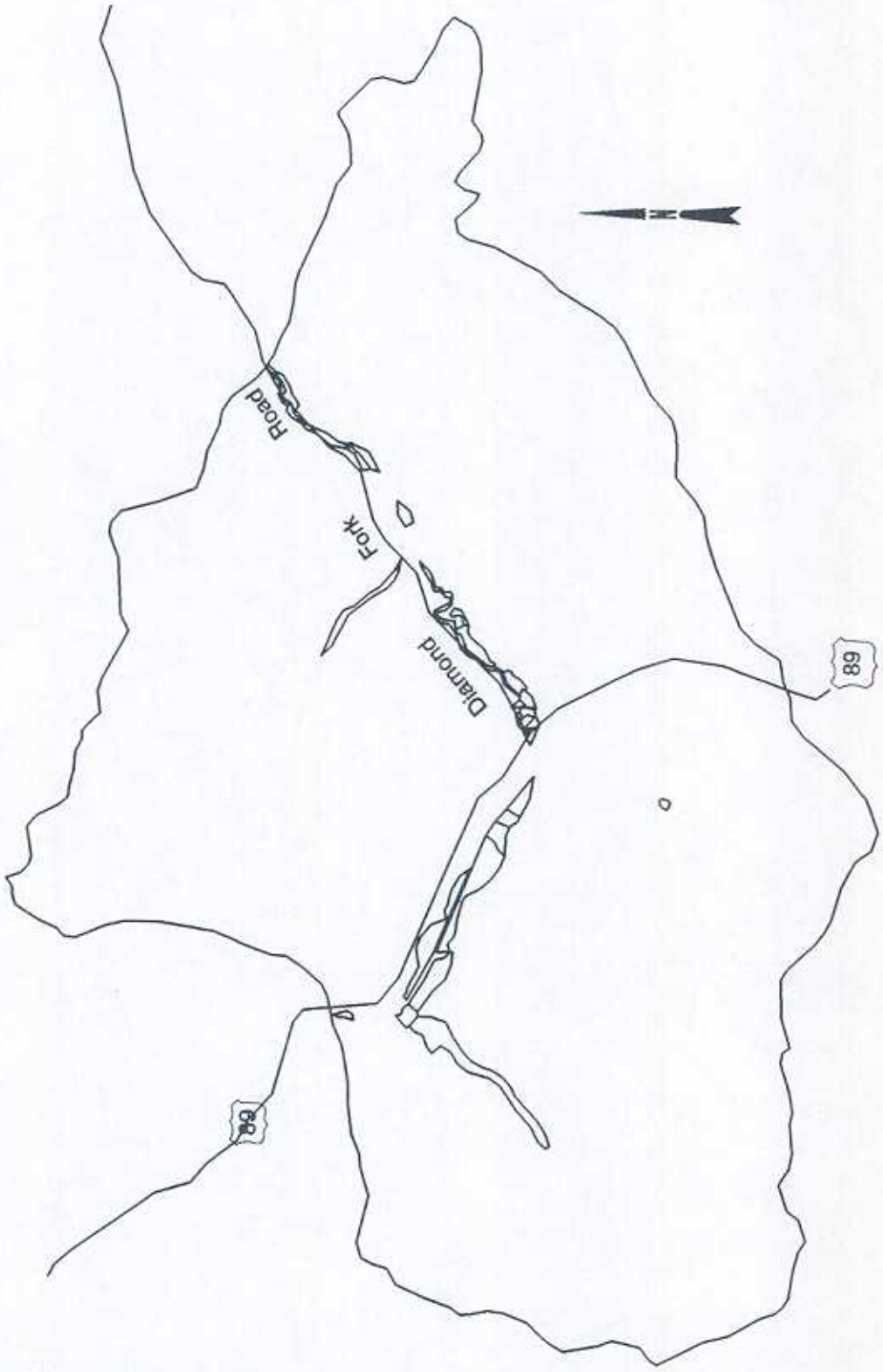


Figure 12. Water-related land use coverage of the Spanish Fork Canyon (04-01-008) subarea.

Land Cover Area Summary for Figure 13.
Hobble Creek (04-01-009) subarea.

Code	Land Cover	Acres
IA3d	Pasture	11
IB2b	Pasture (dry)	352[1]
IIA2a	Pasture (sub irr)	173
VB2	Bldgs/Homes (lo den)	7
VC3	Open Space (Commercial)	277
		820

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.

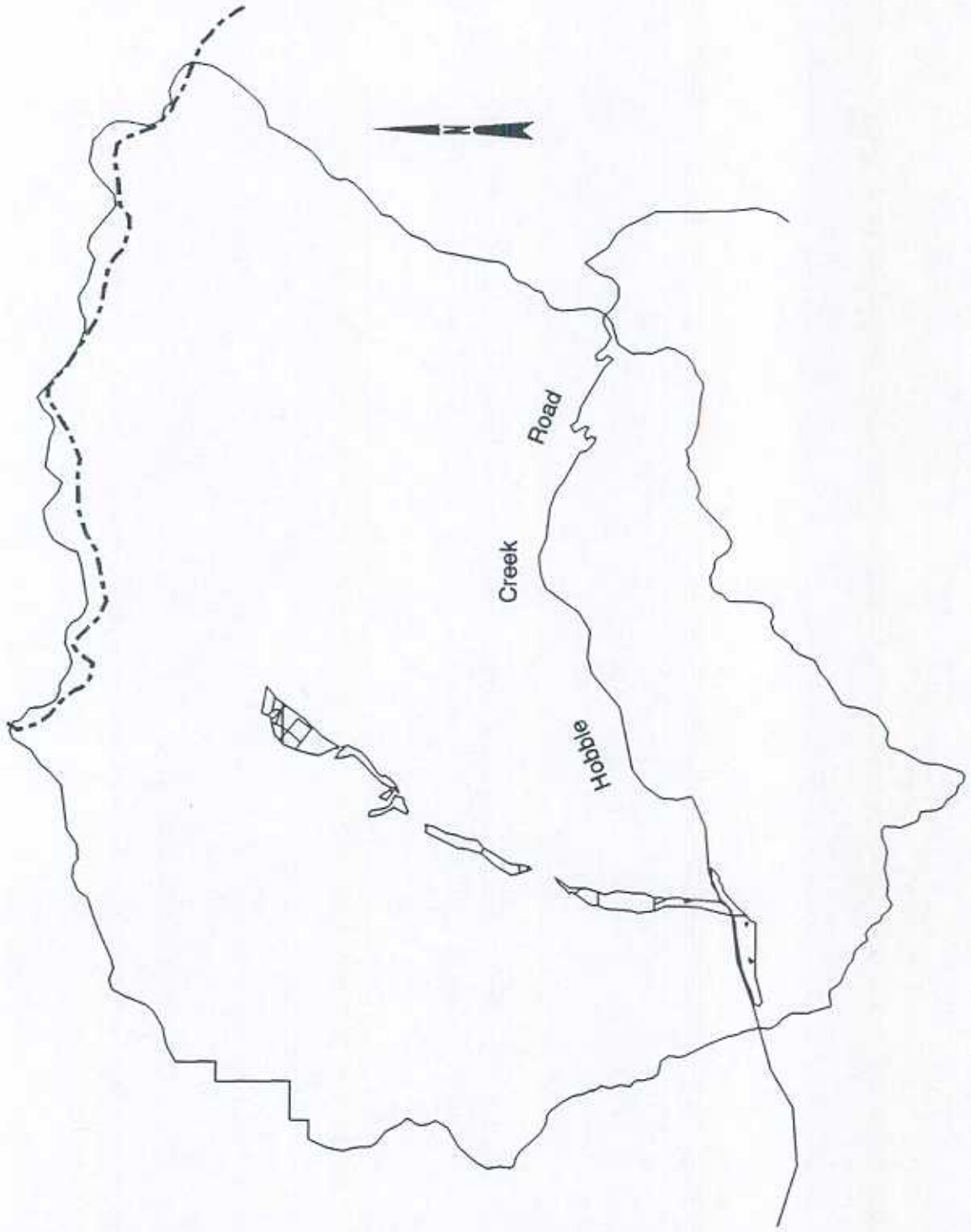


Figure 13. Water-related land use coverage of the Hobble Creek (04-01-009) subarea.

Land Cover Area Summary for Figure 14.
Provo/Uinta (04-01-010) subarea.

Code	Land Cover	Acres
		0
		0

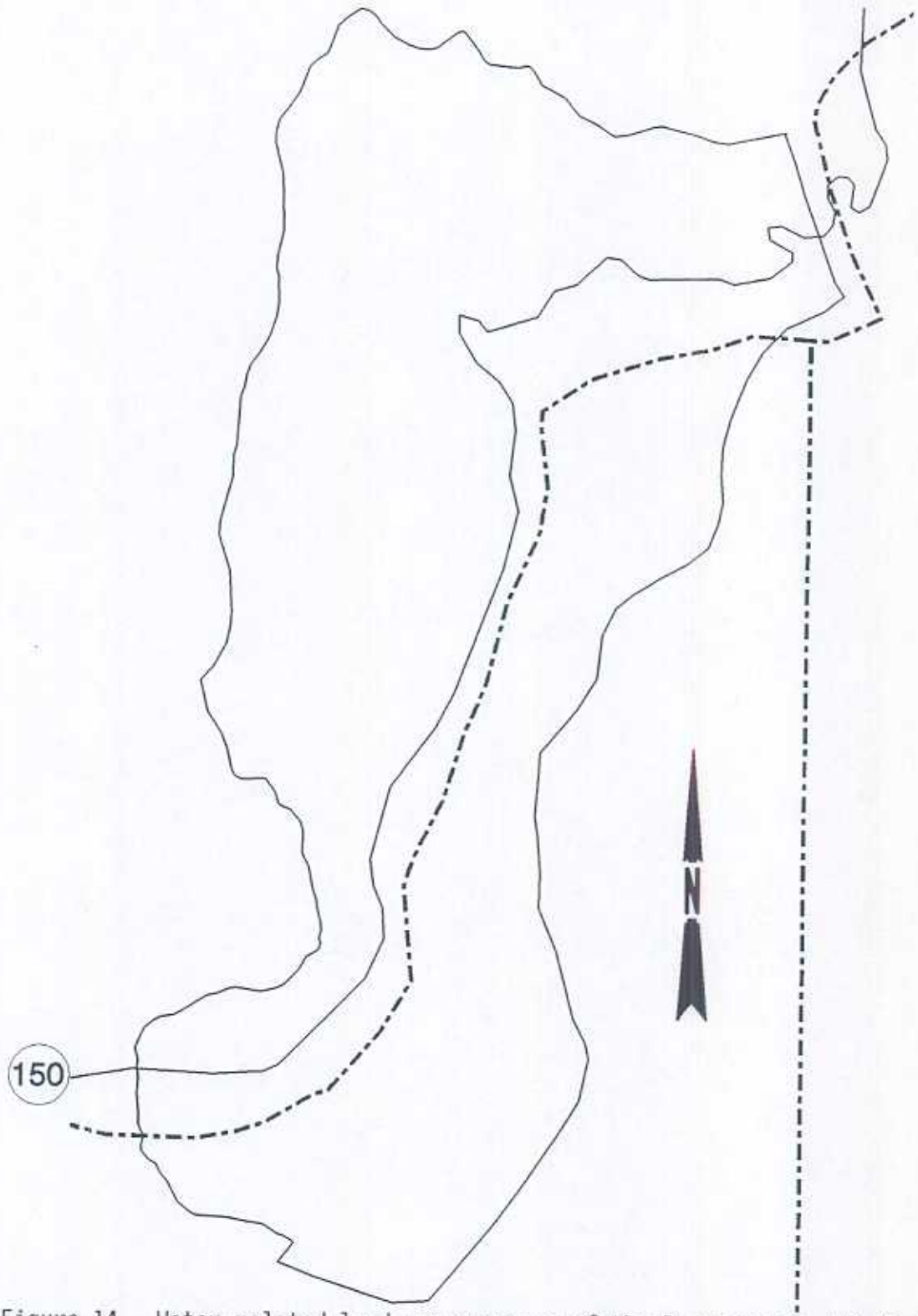
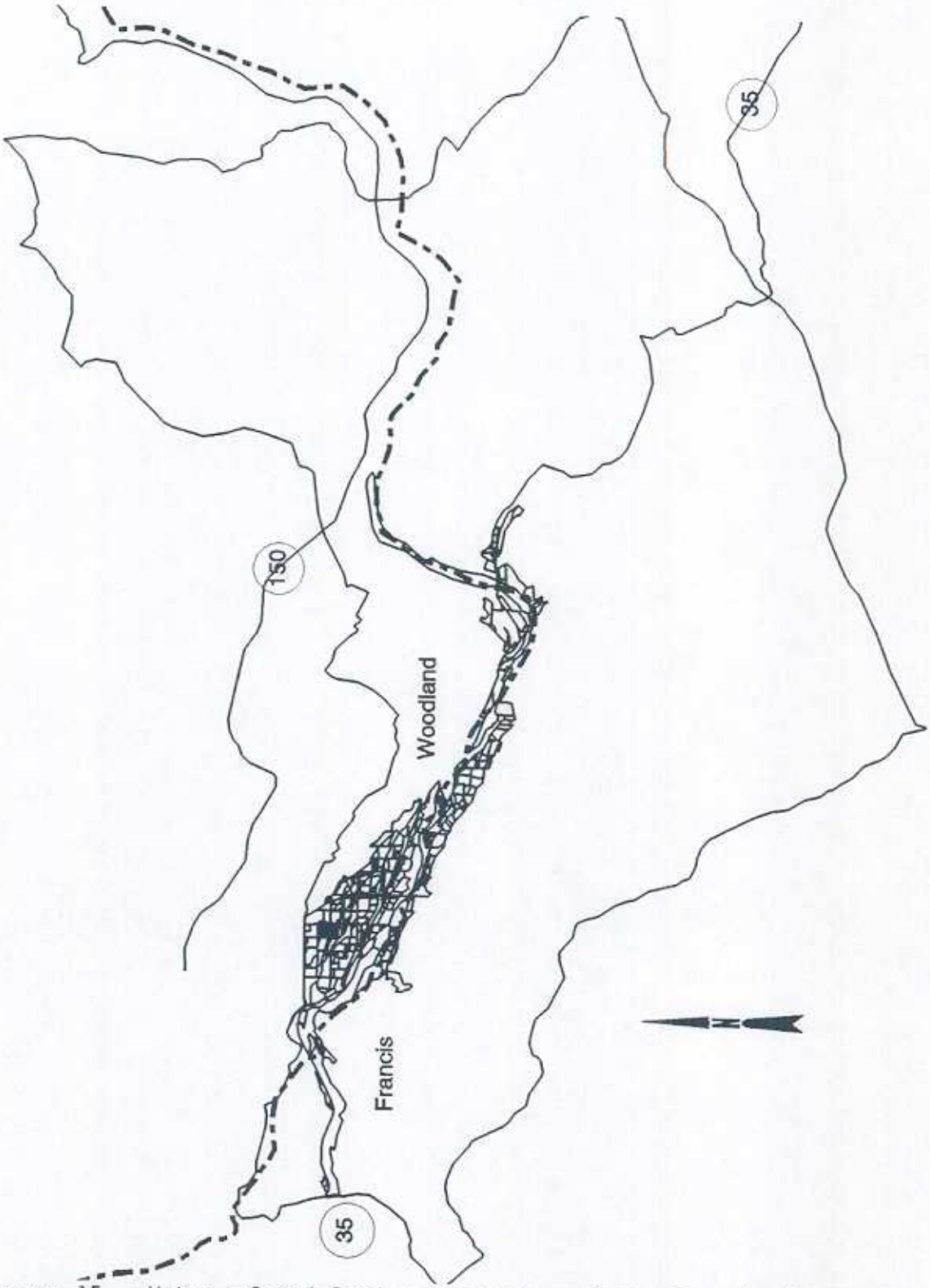


Figure 14. Water-related land use coverage of the Provo/Uinta (04-01-010) subarea.

Land Cover Area Summary for Figure 15.
Francis (04-01-011) subarea.

Code	Land Cover		Acres
IA2a	Grain		50
IA3a	Alfalfa		421
IA3b	Grass Hay		748
IA3d	Pasture		2,293
IA4a	Fallow		9
IA4b	Idle		256
IB2b	Pasture	(dry)	136[1]
IB3b	Idle	(dry)	50[1]
IIA2a	Pasture	(sub irr)	251
IIE	Riparian		1,294
IVC	Excavated Lands		51
VA1	Farmsteads		56
VB2	Residential	(lo den)	384
VB3	Open Spaces		3
			6,002

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.



Fugure 15. Water-related land use coverage of the Francis (04-01-011) subarea.

Land Cover Area Summary for Figure 16.
Round Valley (04-01-012) subarea.

Code	Land Cover	Acres
IA2a	Grain	133
IA3a	Alfalfa	425
IA3b	Grass Hay	749
IA3d	Pasture	1,083
IA4a	Fallow	74
IA4b	Idle	353
IB2b	Pasture (dry)	129[1]
IIA1a	Pasture (surf & sub irr)	359
IIE	Riparian	14
IIF	Open Water	2
VA1	Farmsteads	21
VB2	Residential (lo den)	145
VB3	Open Spaces	6
		3,493

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.

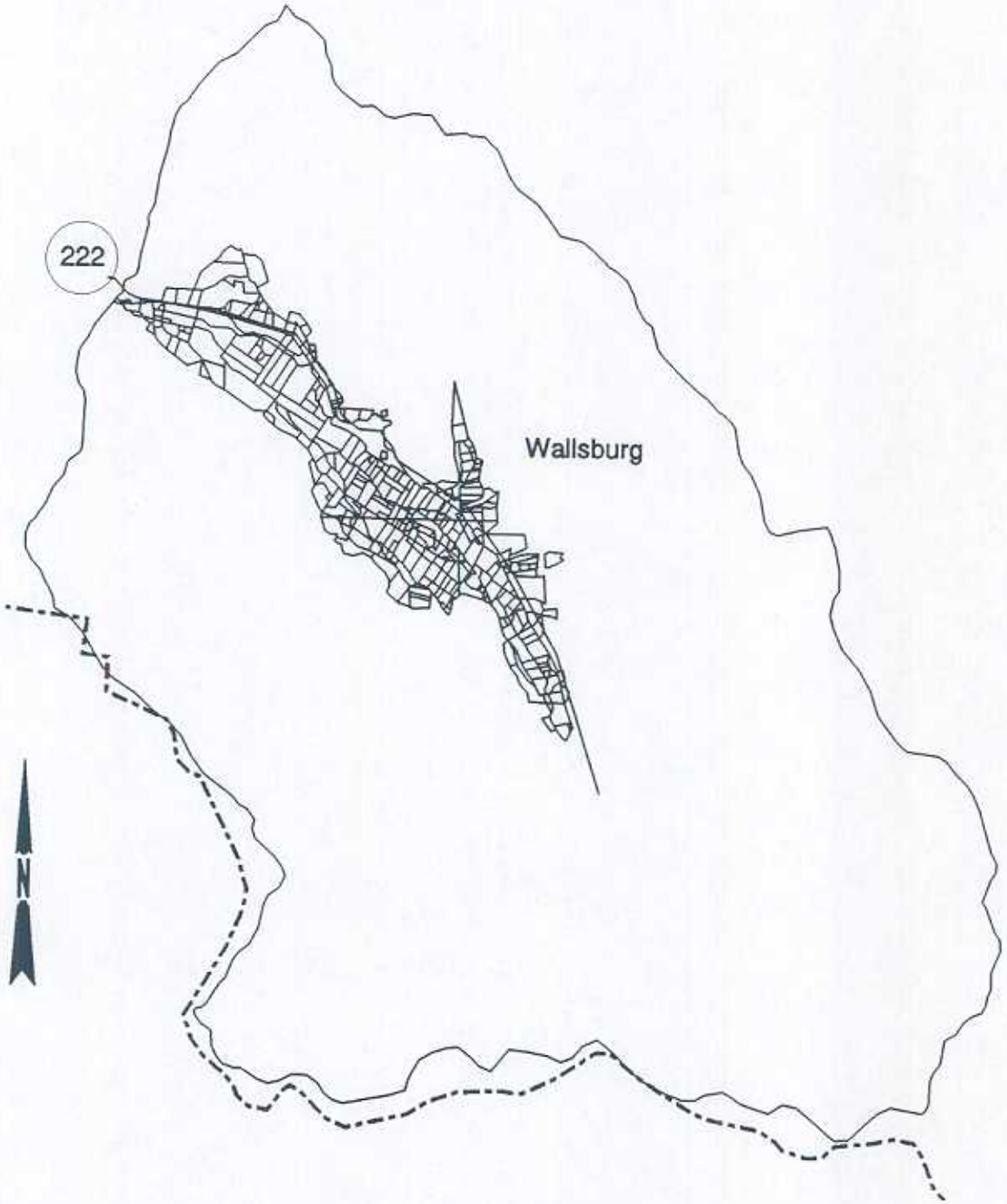


Figure 16. Water-related land use coverage of the Round Valley (04-01-012) subarea.

Land Cover Area Summary for Figure 17.
Heber Valley (04-01-013) subarea.

Code	Land Cover	Acres
IA2a	Grain	1,138
IA2b	Vegetables	79
IA3a	Alfalfa	5,164
IA3b	Grass Hay	1,635
IA3c	Grass/Turf	16
IA3d	Pasture	4,790
IA4a	Idle-Plowed	154
IA4b	Idle	631
IB2b	Pasture (dry)	646[1]
IB3b	Idle (dry)	1,225[1]
IIA1a	Pasture (surf & sub)	2,740
IIA1b	Grass Hay (surf & sub)	723
IIA2a	Pasture (sub irr)	3
IIA2b	Grass Hay (sub irr)	101
IIE	Riparian	939
IIF	Open Water	2,706
IVC	Excavated Lands	517
VA1	Farmsteads	449
VB1	Bldgs/Homes (hi den)	1,139
VB2	Blds/Homes (lo den)	788
VB3	Open Spaces	7
VC	Commercial	27
VC2	Industrial	221
VC3	Open Space (commercial)	459
		26,298

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.

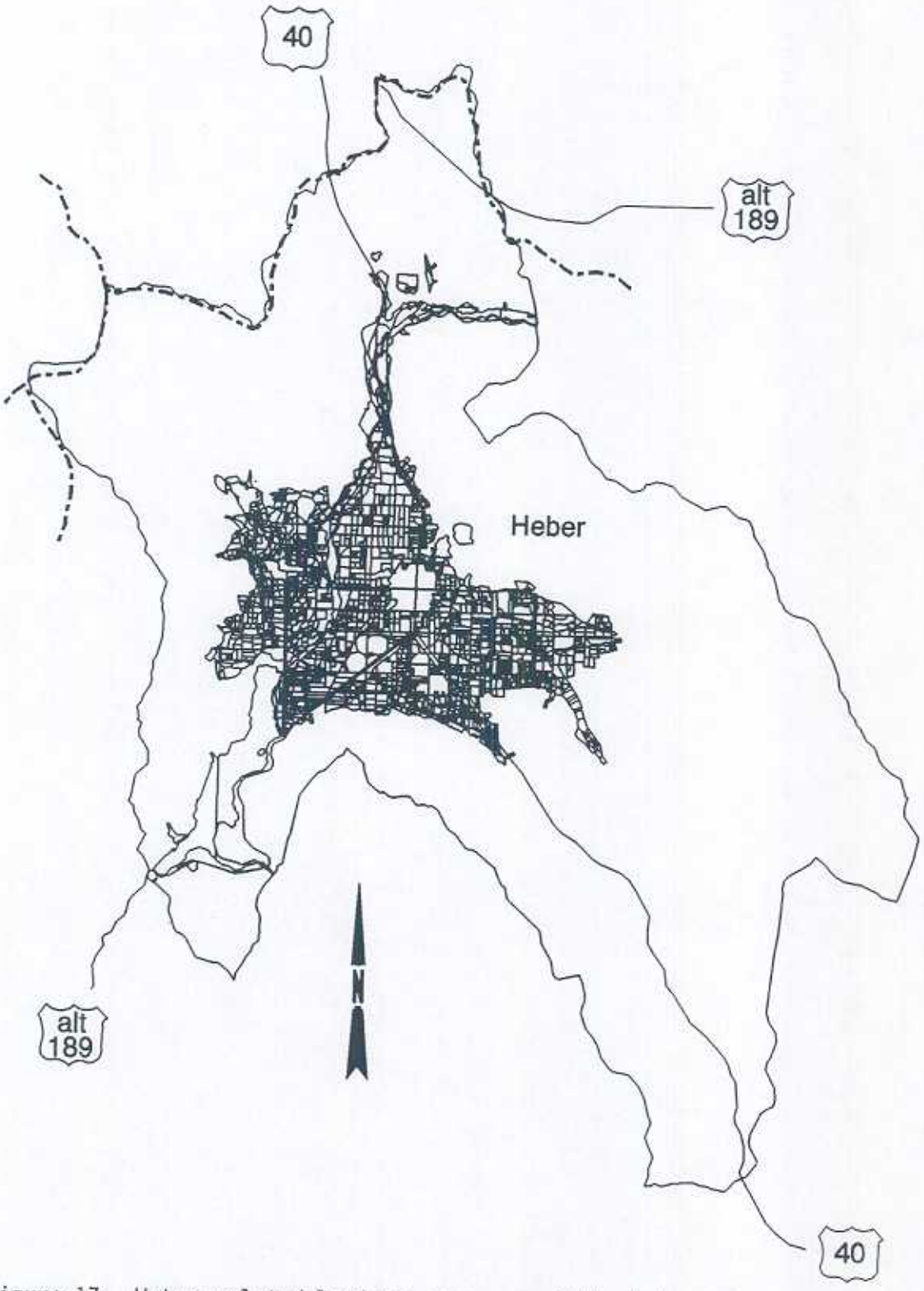


Figure 17. Water-related land use coverage of the Heber Valley (04-01-013) subarea.

Land Cover Area Summary for Figure 18.
South Fork Provo (04-01-014) subarea.

Code	Land Cover	Acres
		0
		0

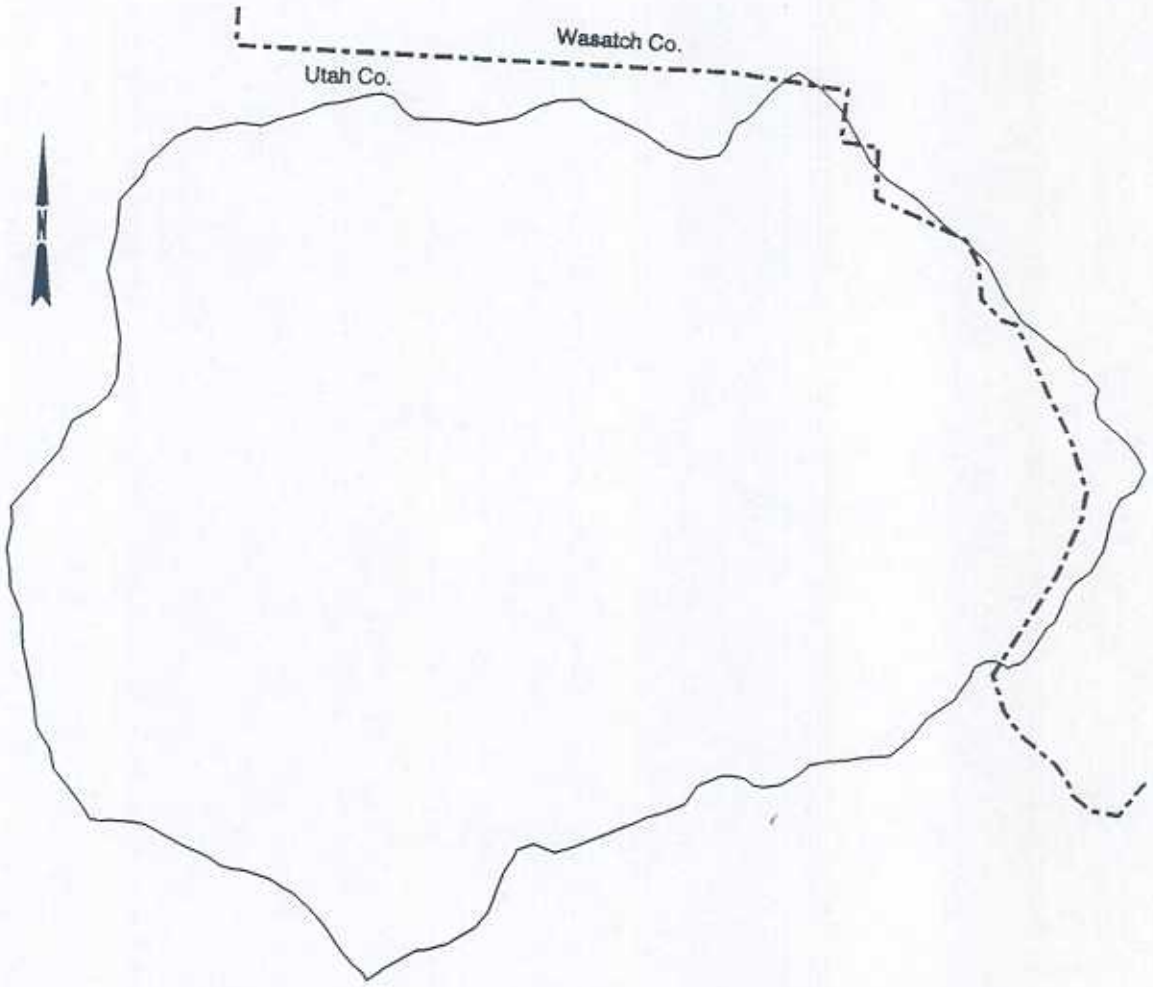


Figure 18. Water-related land use coverage of the South Fork Provo (04-01-014) subarea.

Land Cover Area Summary for Figure 19.
Lower Provo (04-01-015) subarea.

Code	Land Cover	Acres
		0
		0

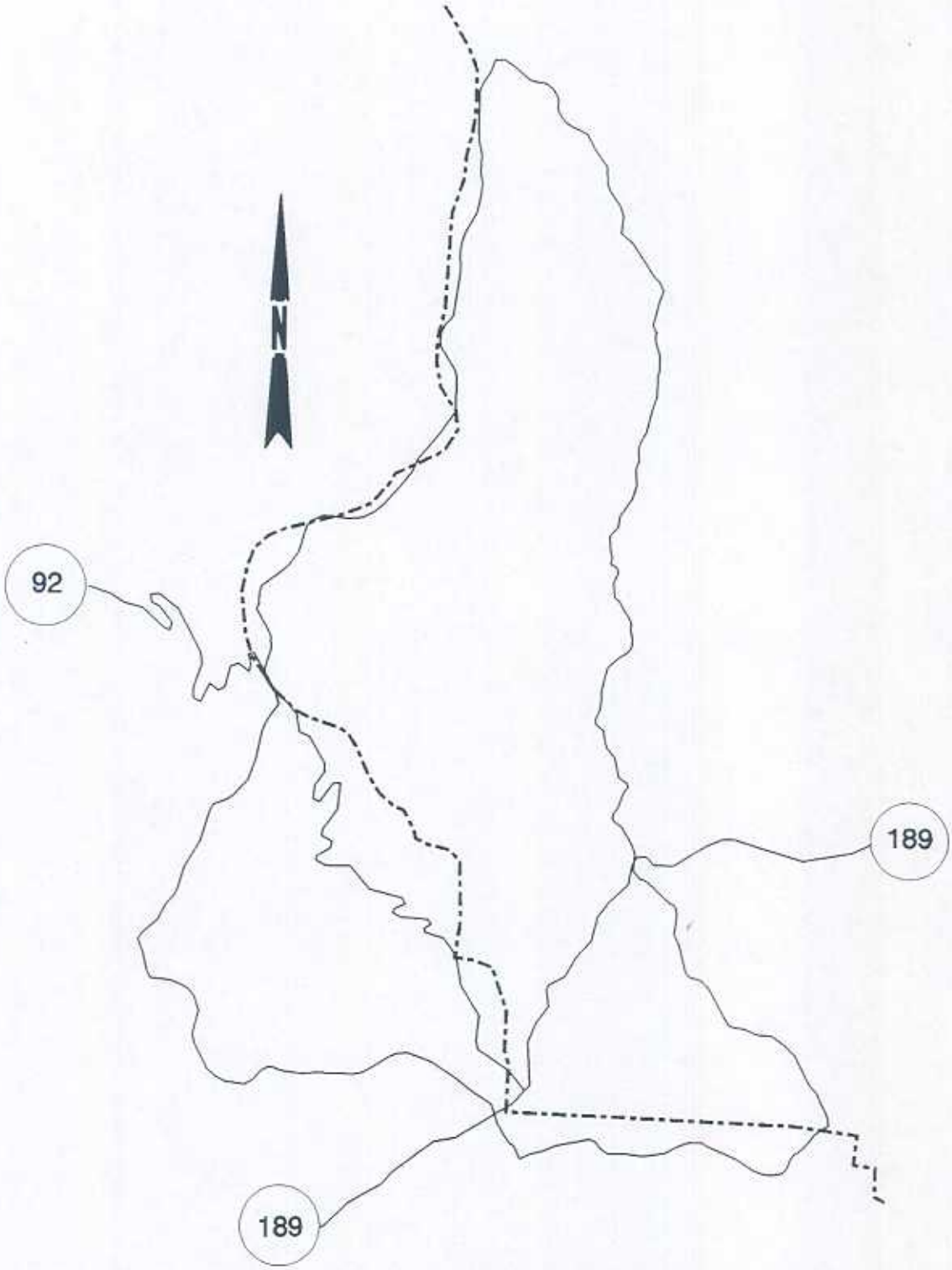


Figure 19. Water-related land use coverage of the Lower Provo (04-01-015) subarea.

Land Cover Area Summary for Figure 20.
American Fork Canyon (04-01-016) subarea.

Code	Land Cover	Acres
		0
		0

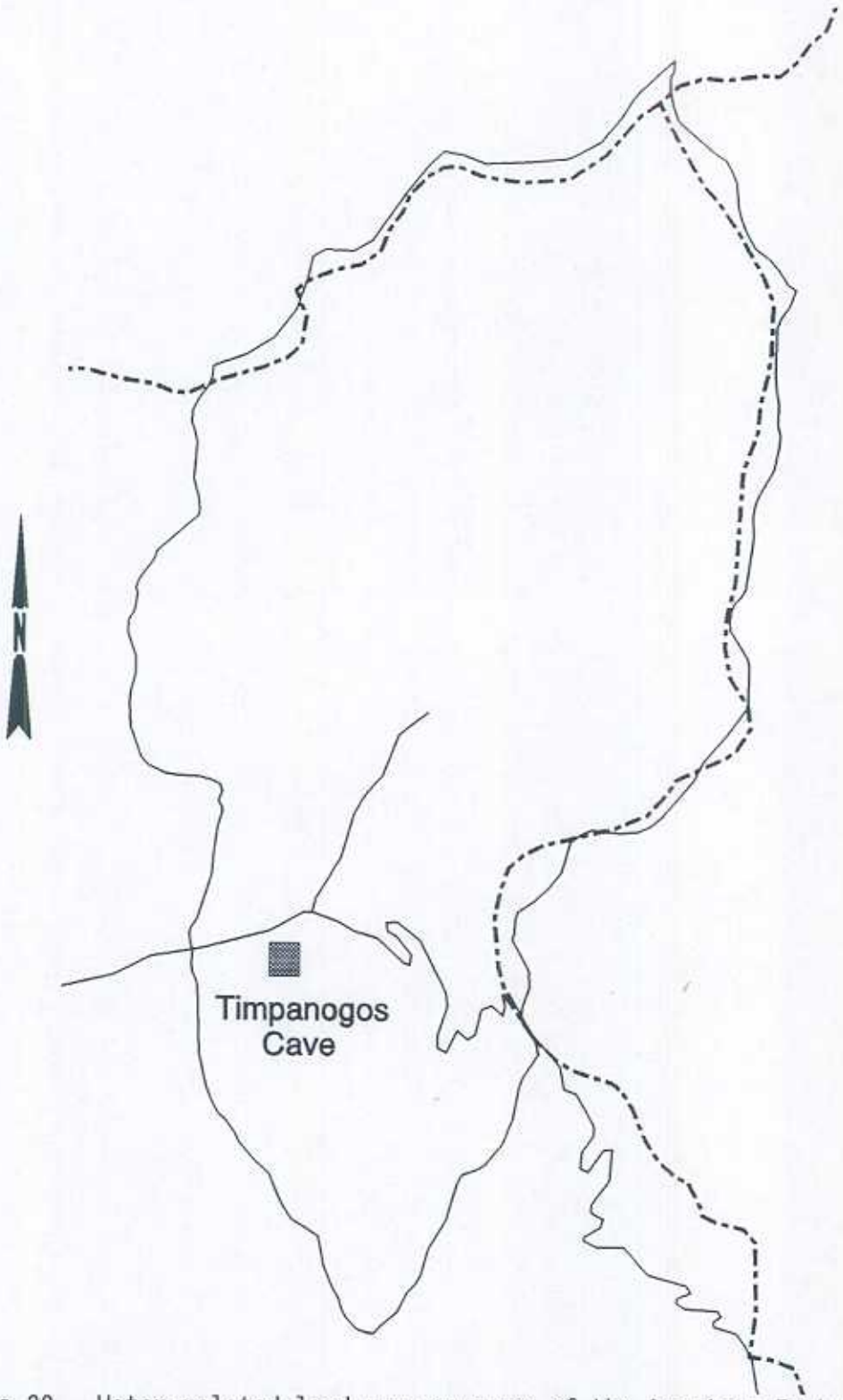


Figure 20. Water-related land use coverage of the American Fork Canyon (04-01-016) subarea.

Land Cover Area Summary for Figure 21.
Cedar Valley (04-01-017) subarea.

Code	Land Cover	Acres
IA2a	Grain	246
IA3a	Alfalfa	1,787
IA3b	Grass Hay	616
IA3c	Grass/Turf	446
IA3d	Pasture	830
IA4a	Idle-Plowed	859
IA4b	Idle	544
IB1a	Grain/Beans/Seeds (dry)	12,270[1]
IB1a4	Safflower (dry)	1,324[1]
IB2a	Alfalfa (dry)	401[1]
IB2b	Pasture (dry)	106[1]
IB3a	Fallow (dry)	9,145[1]
IB3b	Idle (dry)	1,398[1]
IIA2a	Pasture (sub irr)	29
IIB	Cattail/Bullrush Aspect	1,252
IIF	Open Water	310
VA1	Farmsteads	216
VB2	Blds/Homes (lo den)	64
VC	Commercial	12
VC2	Industrial	11
		31,877

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.

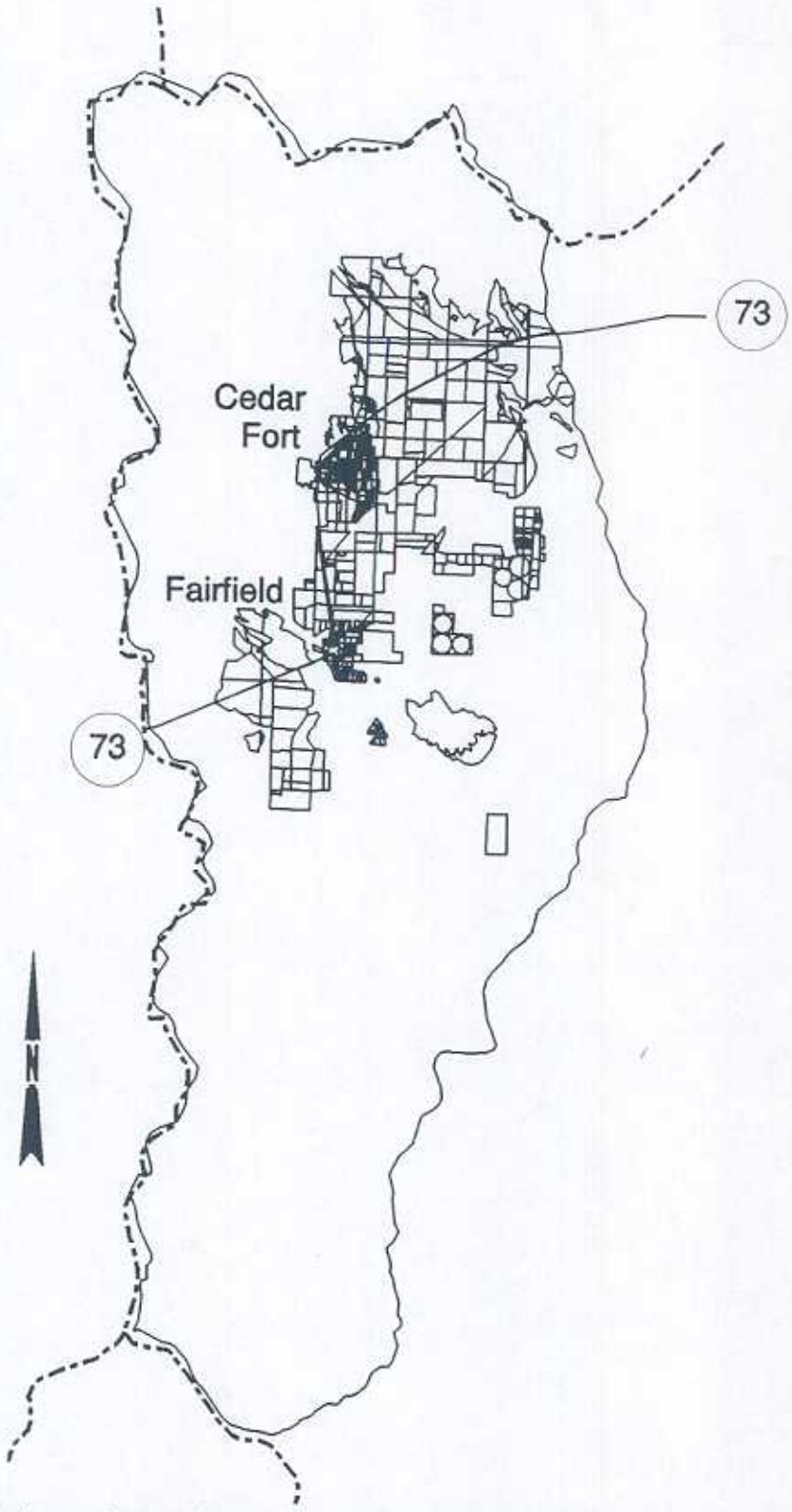


Figure 21. Water-related land use of the Cedar Valey (04-01-017) subarea.

Land Cover Area Summary for Figure 22.
Utah Valley (04-01-018) subarea.

Code	Land Cover	Acres
IA1a	Fruit	9,852
IA1e	Other Horticulture	41
IA1g	Other Spec. Crops	41
IA2a	Grain	22,332
IA2a1	Corn	12,102
IA2a2	Sorgum	35
IA2b	Vegetables	200
IA2b1	Potatoes	16
IA2b6	Other	8
IA3a	Alfalfa	22,243
IA3b	Grass Hay	8,095
IA3c	Grass/Turf	201
IA3d	Pasture	20,907
IA4a	Idle-Plowed	3,588
IA4b	Idle	8,952
IB1a	Grain/Beans/Seeds (dry)	2,167[1]
IB1a4	Safflower (dry)	349[1]
IB2a	Alfalfa (dry)	14[1]
IB2b	Pasture (dry)	2,930[1]
IB3a	Dry Fallow (dry)	2,176[1]
IB3b	Idle (dry)	1,897[1]
IIA	Grassy Aspect	69
IIA1a	Pasture (surf & sub)	182
IIA1b	Grass Hay (surf & sub)	64
IIA2a	Pasture (sub irr)	3,587
IIA2b	Grass Hay (sub irr)	419
IIA2c	Non Ag. Use (phreato)	156
IIB	Cattail/Bullrush Aspect	1,875
IIC	Wet Flats	3
IIE	Riparian	144
IIF	Open Water	560
IIF3	Ponds & Lakes	90,437
IVC	Excavated Lands	17,895
VA1	Farmsteads	2,197
VB1	Bldgs/Homes (hi den)	14,831
VB2	Blds/Homes (lo den)	4,415
VB3	Open Spaces	1,006
VC	Commercial	1,149
VC2	Industrial	5,792
VC3	Open Space (commercial)	128
		263,054

[1]In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agriculture lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown in the table reflect only the number of acres mapped, not the total number of acres in the subarea.

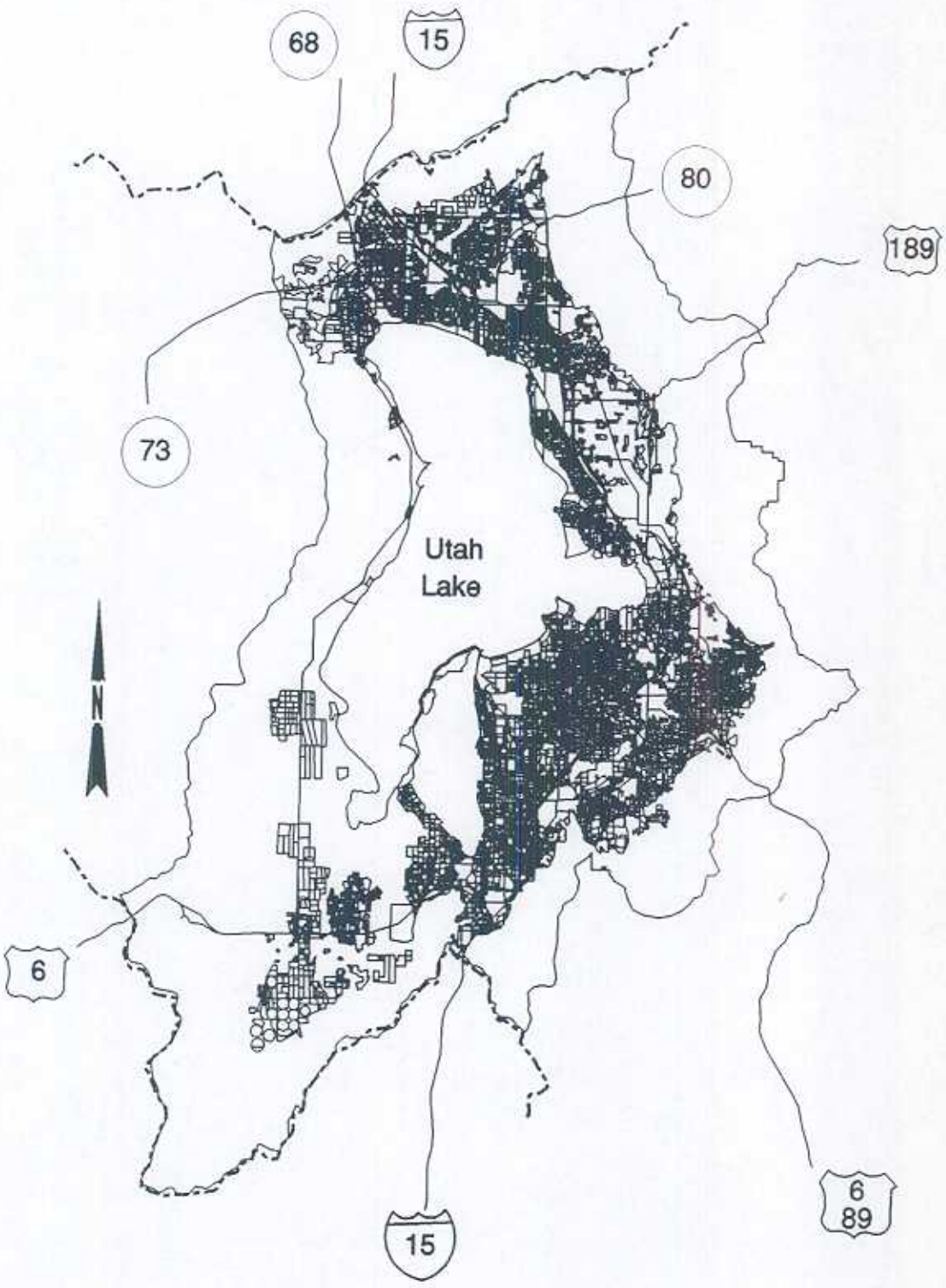


Figure 22. Water-related land use of the Utah Valley (04-01-018) subarea.

The water-related land cover for all the subareas in the study area is summarized in Table 2, and water-related land cover for the counties is summarized in Table 3.

The division inventoried over 368,840 acres of land in the Utah Lake Study Area. This amounts to 19 percent of the entire land area in the Study Area. Areas not inventoried are mainly national forests and rangeland. Of the inventoried acres, 166,394 were irrigated land (including land that was fallow, idle or sub-irrigated), 101,496 were wet/open water areas (including reservoirs) and 36,391 were residential/industrial areas (including farmsteads and rural housing).

Table 2. Summary of land cover by subarea for the Upper Jordan River Study Area (acres).

Code	Cover	Salt Creek 04-01-001	No. Juab Valley 04-01-002	Dog Valley 04-01-003	Santaquin Cyn. 04-01-004	Payson Creek 04-01-005	Thistle 04-01-006	Diamond Fork 04-01-007	Spanish Fk. Cyn. 04-01-008	Hobble Creek 04-01-009
IA1a	Fruit	0	26	0	0	0	0	0	0	0
IA1e	Other Horticulture	0	6	0	0	0	23	0	0	0
IA2a	Grain	0	2,946	0	0	0	519	0	0	0
IA2a1	Corn	0	698	0	0	0	0	0	0	0
IA2b	Vegetables	0	66	0	0	0	0	0	0	0
IA2b1	Potatoes	0	0	0	0	0	0	0	0	0
IA2b2	Onions	0	0	0	0	0	0	0	0	0
IA2b3	Beans	0	0	0	0	0	0	0	0	0
IA2c	Other Row Crops	0	0	0	0	0	0	0	0	0
IA3a	Alfalfa	0	6,416	0	0	0	797	0	85	0
IA3b	Grass Hay	0	563	0	0	0	1,745	0	0	0
IA3c	Grass/Turf	0	0	0	0	0	0	0	0	0
IA3d	Pasture	0	3,268	0	0	0	1,437	0	258	11
IA4a	Fallow	0	1,110	0	0	0	6	0	0	0
IA4b	Idle Overgrown	0	1,460	0	0	0	121	0	0	0
IIA1a	Pasture (surf. & sub.)	0	179	0	0	0	34	0	0	0
IIA1b	Grass Hay (surf. & sub.)	0	0	0	0	0	0	0	0	0
Surface Irr. Cropland Subtotal		0	16,738	0	0	0	4,684	0	343	11
IIA2a	Sub. Irr. Pasture	0	1,111	0	0	0	0	0	0	173
IIA2b	Sub. Irr. Grass Hay	0	661	0	0	0	0	0	5	0
Sub. Irr. Cropland Subtotal		0	1,772	0	0	0	0	0	5	173
Irrigated Croplands Subtotal		0	18,510	0	0	0	4,684	0	348	184
IIB	Cattail/Bullrush Aspect	0	0	0	0	0	0	0	0	0
IIB-E	Wet/Vegetation Asp.	0	0	0	0	0	0	0	0	0
IIC	Wet Flats	0	0	0	0	0	0	0	0	0
IIE	Riparian	0	0	0	0	0	244	0	31	0
IIF	Open Water	0	1,233	0	0	0	26	33	87	0
IIF2	Reservoirs	0	0	0	0	0	0	0	0	0
IIF4a	Temporary Flooded	0	0	0	0	0	0	0	0	0
IIF4b	Sewage Lagoon	0	25	0	0	0	0	0	0	0
IIF4c	Evaporation Pond	0	114	0	0	0	0	0	0	0
Wet/Open Water Subtotal		0	1,372	0	0	0	270	33	118	0
VA	Farmsteads	0	338	0	0	0	51	0	0	0
VB	Residential	0	1,732	0	0	0	5	0	11	7
VB3	Open Spaces	0	80	0	0	0	0	0	0	0
VC	Commercial/Industrial	0	360	0	0	0	3	0	0	277
Residential/Industrial Subtotal		0	2,510	0	0	0	59	0	11	284
Land Use/Land Cover Totals		0	22,392	0	0	0	5,013	33	477	468

Table 2. Continued.

Code	Cover	Provo/Uinta 04-01-010	Francis 04-01-011	Round Valley 04-01-012	Heber Valley 04-01-013	So. Fk. Provo 04-01-014	Lower Provo 04-01-015	Am. Fk. Cyn. 04-01-016	Cedar Valley 04-01-017	Utah Valley 04-01-018	Total
IA1a	Fruit	0	0	0	0	0	0	0	0	9,852	9,878
IA1e	Other Horticulture	0	0	0	0	0	0	0	0	82	111
IA2a	Grain	0	50	133	1,138	0	0	0	246	22,332	27,364
IA2a1	Corn	0	0	0	0	0	0	0	0	12,137	12,835
IA2b	Vegetables	0	0	0	79	0	0	0	0	200	345
IA2b1	Potatoes	0	0	0	0	0	0	0	0	16	16
IA2b2	Onions	0	0	0	0	0	0	0	0	0	0
IA2b3	Beans	0	0	0	0	0	0	0	0	0	0
IA2c	Other Row Crops	0	0	0	0	0	0	0	0	8	8
IA3a	Alfalfa	0	421	425	5,164	0	0	0	1,787	22,243	37,338
IA3b	Grass Hay	0	748	749	1,635	0	0	0	616	8,095	14,151
IA3c	Grass/Turf	0	0	0	16	0	0	0	446	201	663
IA3d	Pasture	0	2,293	1,083	4,790	0	0	0	830	20,907	34,877
IA4a	Fallow	0	9	74	154	0	0	0	859	3,588	5,802
IA4b	Idle Overgrown	0	256	353	631	0	0	0	544	8,952	12,317
IIA1a	Pasture (surf. & sub.)	0	0	359	2,740	0	0	0	0	182	3,494
IIA1b	Grass Hay (surf. & sub.)	0	0	0	723	0	0	0	0	64	787
Surface Irr. Cropland Subtotal		0	3,777	3,176	17,070	0	0	0	5,328	108,859	159,986
IIA2a	Sub. Irr. Pasture	0	251	0	3	0	0	0	29	3,587	5,154
IIA2b	Sub. Irr. Grass Hay	0	0	0	101	0	0	0	0	487	1,254
Sub. Irr. Cropland Subtotal		0	251	0	104	0	0	0	29	4,074	6,408
Irrigated Croplands Subtotal		0	4,028	3,176	17,174	0	0	0	5,357	112,933	166,394
IIB	Cattail/Bullrush Aspect	0	0	0	0	0	0	0	1,252	1,875	3,127
IIB-E	Wet/Vegetation Asp.	0	0	0	0	0	0	0	0	156	156
IIC	Wet Flats	0	0	0	0	0	0	0	0	3	3
IIE	Riparian	0	1,294	14	939	0	0	0	0	144	2,666
IIF	Open Water	0	0	2	2,706	0	0	0	310	90,997	95,394
IIF2	Reservoirs	0	0	0	0	0	0	0	0	0	0
IIF4a	Temporary Flooded	0	0	0	0	0	0	0	0	0	0
IIF4b	Sewage Lagoon	0	0	0	0	0	0	0	11	0	36
IIF4c	Evaporation Pond	0	0	0	0	0	0	0	0	0	114
Wet/Open Water Subtotal		0	1,294	16	3,645	0	0	0	1,573	93,175	101,496
VA	Farmsteads	0	56	21	449	0	0	0	216	2,197	3,328
VB	Residential	0	384	145	1,928	0	0	0	64	19,247	23,523
VB3	Open Spaces	0	3	6	7	0	0	0	0	1,086	1,102
VC	Commercial/Industrial	0	0	0	707	0	0	0	23	7,068	8,438
Residential/Industrial Subtotal		0	443	172	3,091	0	0	0	303	29,518	36,391
Land Use/Land Cover Totals		0	5,765	3,364	23,910	0	0	0	7,233	235,626	304,281

Table 3. Summary of land cover by county for the Upper Jordan River Study Area (acres).

Code	Cover	Juab Co.	SanPete Co.	Summit Co.	Utah Co.	Wasatch Co.	Co. Total
IA1a	Fruit	26	0	0	9,852	0	9,878
IA1e	Other Horticulture	6	23	0	82	0	111
IA2a	Grain	2,946	442	35	22,655	1,286	27,364
IA2a1	Corn	698	0	0	12,137	0	12,835
IA2b	Vegetables	66	0	0	200	79	345
IA2b1	Potatoes	0	0	0	16	0	16
IA2b2	Onions	0	0	0	0	0	0
IA2b3	Beans	0	0	0	0	0	0
IA2c	Other Row Crops	0	0	0	8	0	8
IA3a	Alfalfa	6,416	588	217	24,324	5,793	37,338
IA3b	Grass Hay	563	1,245	659	9,211	2,473	14,151
IA3c	Grass/Turf	0	0	0	647	16	663
IA3d	Pasture	3,268	497	1,491	22,946	6,675	34,877
IA4a	Fallow	1,110	8	0	4,447	237	5,802
IA4b	Idle Overgrown	1,460	84	256	9,533	984	12,317
IIA1a	Pasture (surf. & sub.)	179	34	0	182	3,099	3,494
IIA1b	Grass Hay (surf. & sub.)	0	0	0	64	723	787
Surface Irr. Cropland Subtotal		16,738	2,921	2,658	116,304	21,365	159,986
IIA2a	Sub. Irr. Pasture	1,111	0	251	3,789	3	5,154
IIA2b	Sub. Irr. Grass Hay	661	0	0	492	101	1,254
Sub. Irr. Cropland Subtotal		1,772	0	251	4,281	104	6,408
Irrigated Croplands Subtotal		18,510	2,921	2,909	120,585	21,469	166,394
IIB	Cattail/Bullrush Aspect	0	0	0	3,127	0	3,127
IIB-E	Wet/Vegetation Asp.	0	0	0	156	0	156
IIC	Wet Flats	0	0	0	3	0	3
IIE	Riparian	0	0	710	419	1,537	2,666
IIF	Open Water	1,233	5	0	91,448	2,708	95,394
IIF2	Reservoirs	0	0	0	0	0	0
IIF4a	Temporary Flooded	0	0	0	0	0	0
IIF4b	Sewage Lagoon	25	0	0	11	0	36
IIF4c	Evaporation Pond	114	0	0	0	0	114
Wet/Open Water Subtotal		1,372	5	710	95,164	4,245	101,496
VA	Farmsteads	338	24	31	2,440	495	3,328
VB	Residential	1,732	5	323	19,329	2,134	23,523
VB3	Open Spaces	80	0	3	1,006	13	1,102
VC	Commercial/Industrial	360	0	0	7,371	707	8,438
Residential/Industrial Subtotal		2,510	29	357	30,146	3,349	36,391
Land Use/Land Cover Totals		22,392	2,955	3,976	245,895	29,063	304,281

METHODOLOGY FOR GATHERING LAND USE DATA

Background

The methodology used by the division over the past 25 years in conducting water-related land use studies has varied with regard to the procedures used, detail, etc. Earlier inventories were prepared with large format vertical-aerial photographs supplemented with field surveys to label boundaries, vegetation types, and other water use information.

After identifying crops and labeling photographs, the photographs were projected onto a base map and then planimetered or "dot-counted" to determine the acreage. Tables for individual townships and ranges were prepared showing total land within every section and the amount of land in each land use category. Data were then available for use in preparing water budgets.

The water-related land use inventories completed by the division and the U.S. Soil Conservation Service (SCS) over the last 25 years have essentially covered the entire state. The two agencies have inventoried about 4 million acres (including 1.4 million acres of irrigated land) in order to acquire the data needed to prepare hydrologic inventories and to conduct other water-related studies in Utah.

In the early 1980s, the division began updating its methodology for collecting water-related land use data to take advantage of the rapidly growing fields of remotely sensed data and computerized Geographic Information Systems (GIS). Updating land use data for each hydrologic area of the state is an on-going process, and the division has now developed procedures for consistent data gathering and for updating it at 7- to 10-year intervals.

For several years, the division contracted with the University of Utah Research Institute, Center for Remote Sensing and Cartography (CRSC), to prepare water-related land use inventories. During this period, water-related land use data was obtained by using high altitude color infrared photography and laboratory interpretation, with field checking. More recently, the division has entered into cooperative agreements with several federal and other state agencies to complete and update all land use data for the state of Utah.

Present Method

In March 1984, several division staff members visited the California Department of Water Resources to observe its methodology for collecting water-related land use data for state water planning purposes. The division, based on its review of the California methodology and its own experience, developed a water-related land use inventory program. This program includes the use of 35mm slides, USGS 7-1/2 minute quadrangle maps, field-mapping using base maps produced from the 35mm photography and a computerized geographic information system to process, store and retrieve land use data.

The first step in a water-related land use inventory is to identify areas to be covered with aerial photography for any individual year. These areas are identified on maps of suitable scale (usually 1:100,000) using previous land use studies and other available information such as maps generated from high altitude color infrared photography or Landsat. Flight lines plotted on the maps show land areas to be covered with aerial photography. Flight lines are generally plotted running north and south through the center of the sections to be photographed. An exception to the

practice is a long narrow canyon with irrigated land only in the bottom. When this situation is encountered, the flight line will follow the canyon without regard to section lines or compass directions.

During the second step, identified areas are photographed using 35mm slide film. Ideally, the 35mm photography should be conducted at a time of year that shows the highest contrast between the water-related land use areas (mainly irrigated land) and surrounding areas. When field mapping/checking is to be conducted in the same season, the photographs are taken as early in the growing season as possible. The division has generally found that the period from June 15 to July 15 is the best time for this photography. The division specifies that aerial photographs be obtained using an aircraft (Figure 10) carrying a high quality 35mm single lens reflex camera mounted to focus along a vertical axis to the earth. A 24mm lens is required and photos must be taken between 6,000 and 6,500 feet above the ground. This procedure allows each slide to cover a little more than one square mile with approximately 30 percent overlap on the wide side of the slide and 5 percent on the slide's narrow side. High quality commercial color positive film is used with appropriate commercial processing after each day's flight. The slides are then cataloged according to the flight-line number and shown on a location map. All 35mm slides are stored in files at the division offices and cataloged according to individual quadrangle map location.

After cataloging the slides, the division transfers boundaries of water-related areas from the slide to USGS 7-1/2 minute quadrangle maps using a standard slide projector with a 100-200mm zoom lens. The image is directed from the projector, located below a glass table top, to a 45 degree first surface mirror to the back of a quadrangle map. The image showing through

Figure 23. Typical aircraft used for aerial photography.

the map is adjusted to the map scale with the zoom lens. Field boundaries and other water-use boundaries are then traced on the 7-1/2 minute quadrangle map. At the same time, a technician attempts to identify the category of land use or land cover and uses a code for the appropriate category in each water use area on the field map. The date that transfer of slide data was completed is also noted on the map. Figure 24 illustrates this basic procedure.

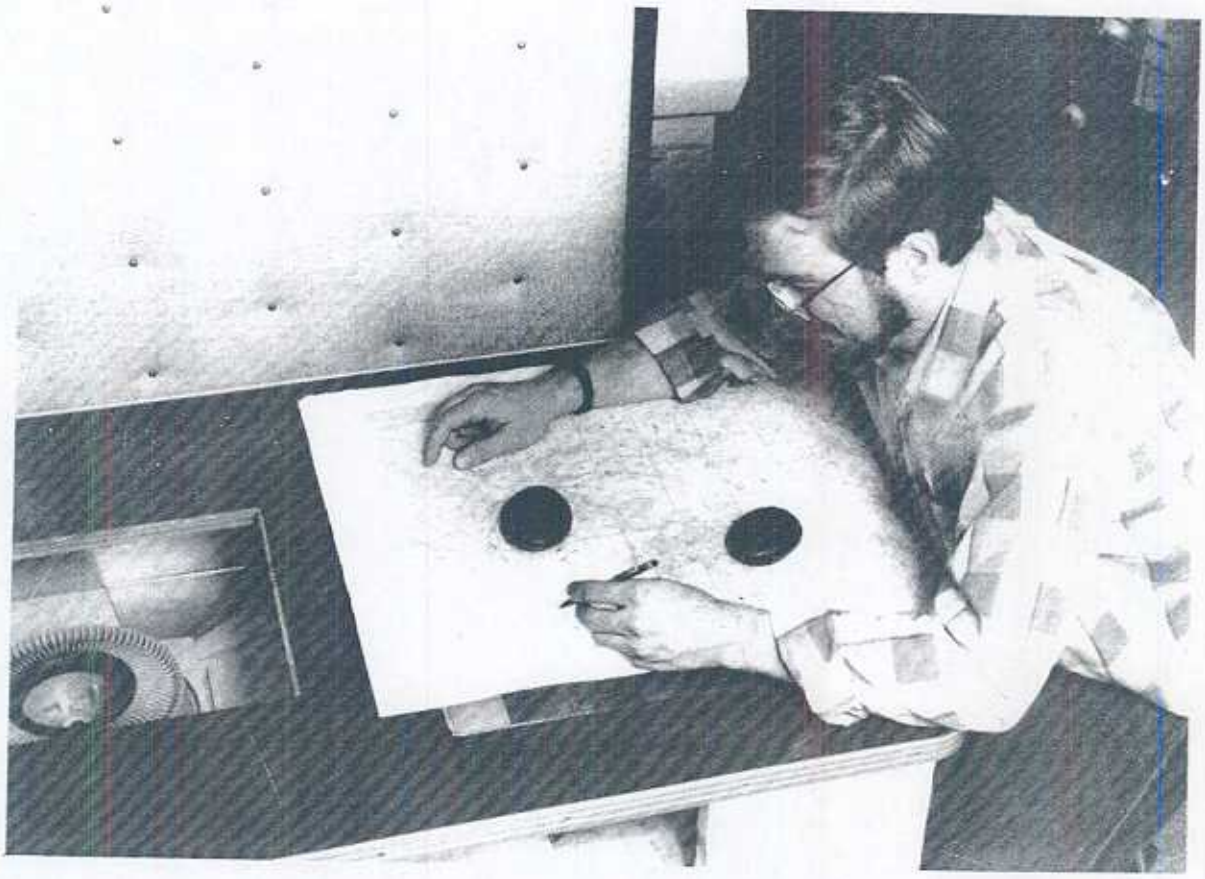


Figure 24. Mapper transferring slide data to field map.

After the slide data are transferred to the quadrangle map, a two-person team uses the map in the field to check the boundaries and land use data on the quadrangle and marks in red the actual land use or land cover category if it is different than the category originally identified. After the land classification on the quadrangle map has been field-checked, the field team marks the completion date on the edge of the map. Figure 25 shows a Division of Water Resources field map after field-checking has been completed.

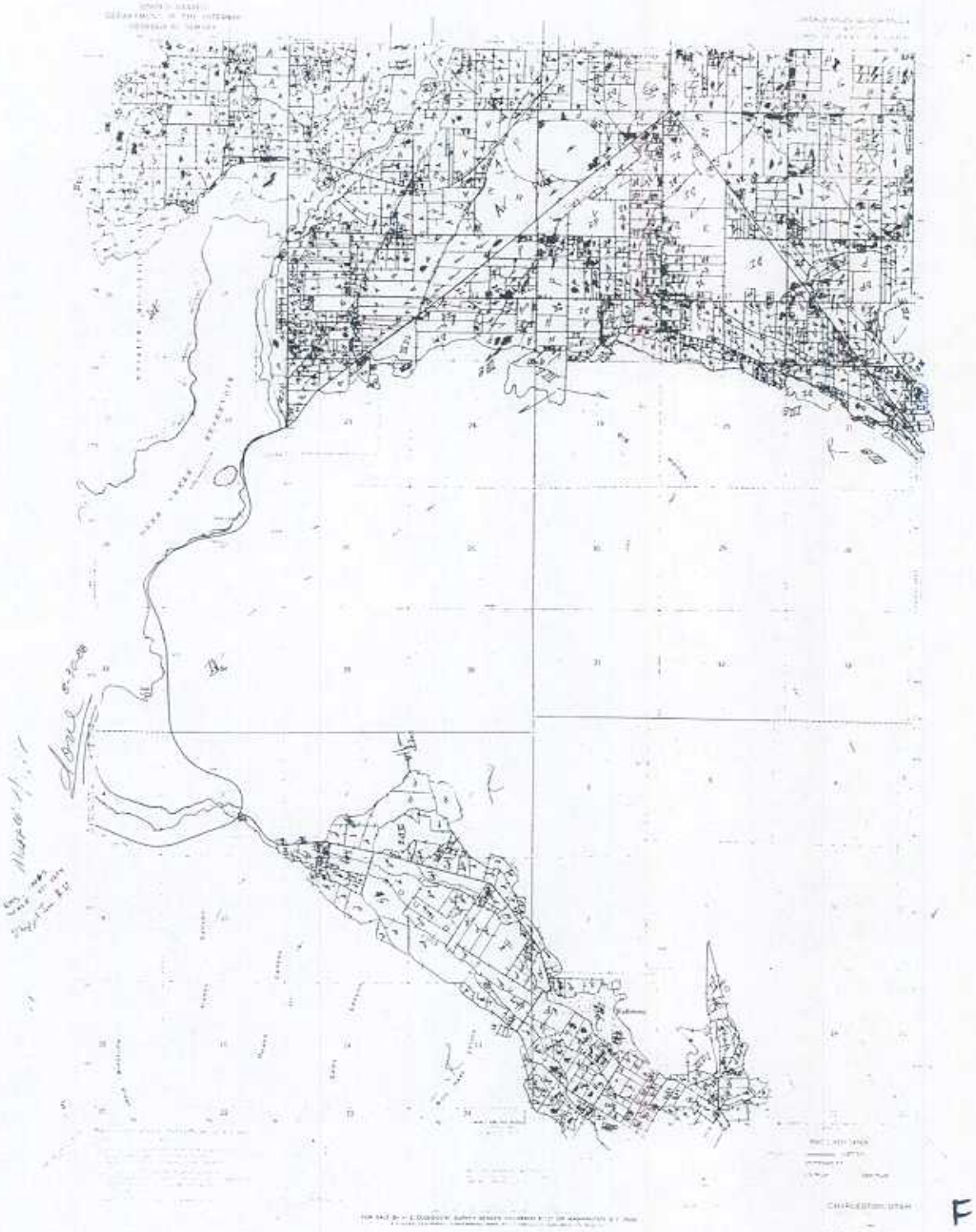


Figure 25. Field map after field checking has been completed. (Charleston Quadrangle)

The next step is to digitize and process the field data. Digitizing is the process of converting data from map or image form to digital form for computer analysis. Typically, digitizing and entering the categories of land use into the computer is performed during the fall and winter following the aerial photography. This is accomplished by using ESRI ARC/INFO Software and a digitizer board large enough to hold a quadrangle map. The division's digitizing work station is shown in Figure 26. All processed data is filed in the State AGRC database. The division uses the special data management and geographic information management capabilities of the AGRC ARC/INFO system to produce tabulated water-related land use maps.

Figure 26. Digitizing work station.

Once the land use data have been digitized and processed through the AGRC ARC/INFO system, the division plots out a 7-1/2 minute quadrangle line map of the data. These plots are overlaid on the field maps to check for errors in recording or digitizing. An example of a line map of the Charleston quadrangle is shown in Figure 27.

Computer-Generated Line Maps Legend for Figure 27.
Utah Lake Study Area.

Label	Code	Cover Type
O	IA1a	Orchards
BR	IA1e	Berries
G	IA2a	Grain
C	IA2a1	Corn
V	IA2b	Vegetables
PO	IA2b1	Potatoes
ON	IA2b2	Onions
B	IA2b3	Beans
T	IA2b4	Tomatoes
S	IA2c	Other Row Crops
A	IA3a	Alfalfa
P1	IA3b	Grass Hay
P	IA3d	Pasture
TF	IA3e	Turf/Grass Yards
F	IA4a	Idle-Plowed
I	IA4b	Idle-Overgrown
DG	IB1a	Non Irr. Crops
DA	IB2a	Non Irr. Alfalfa
DP	IB2b	Non Irr. Pasture
DF	IB3a	Non Irr. Idle-Plowed
DI	IB3b	Non Irr. Idle-Overgrown
IWP	IIA2a1	Irrigated Wet Pasture
IWP1	IIA2a2	Irrigated Wet Grass Hay
WP	IIA2b1	Wet Pasture/Non Irr.
WP1	IIA2b2	Non Irr. F.W. Hay Land
WF	IIC	Wet Flats
WR	IIB	Cattail/Bulrush
W	IIF	Open Water
WM	IIF4a	Temp. Flooded/Marsh
SL	IIF4b	Sewage Lagoons
EP	IIF4c	Evaporation Pond
R	VB1	Buildings/Homes
R2	VB2	Buildings/Homes
RP	VB3	Open Spaces
R	VB6a	Residential
CM	VC1	Commercial
CI	VC2	Industrial
CS	VC3	Open Spaces

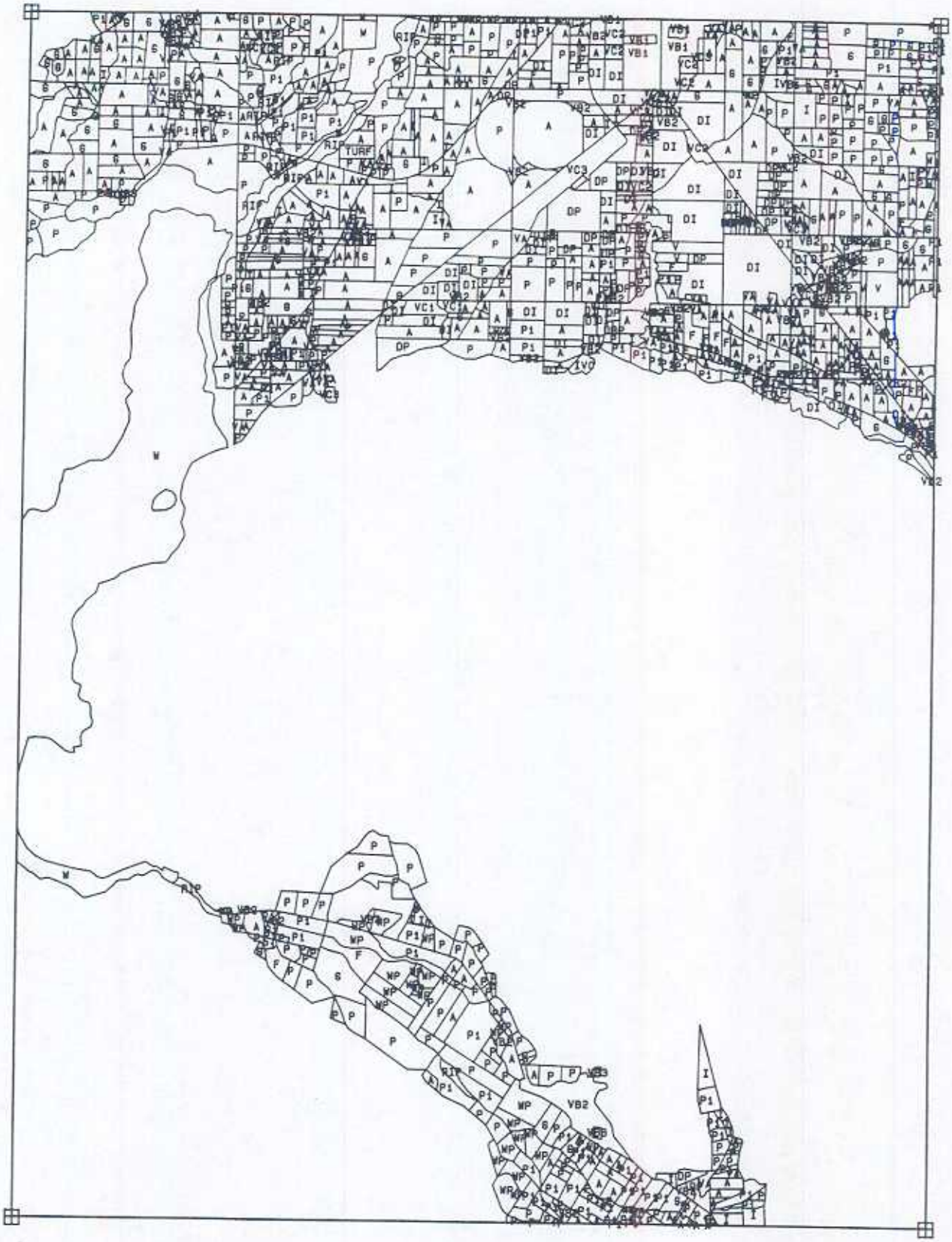


Figure 27. Computer-generated line map of the Charleston 7-1/2 minute quadrangle.

Once checked, the data in the AGRC ARC/INFO system become available for use in water resource planning studies. A map of the Charleston quadrangle, similar to what might be obtained from the AGRC, is shown in Figure 28.

Legend for computer generated color map Figure 28.

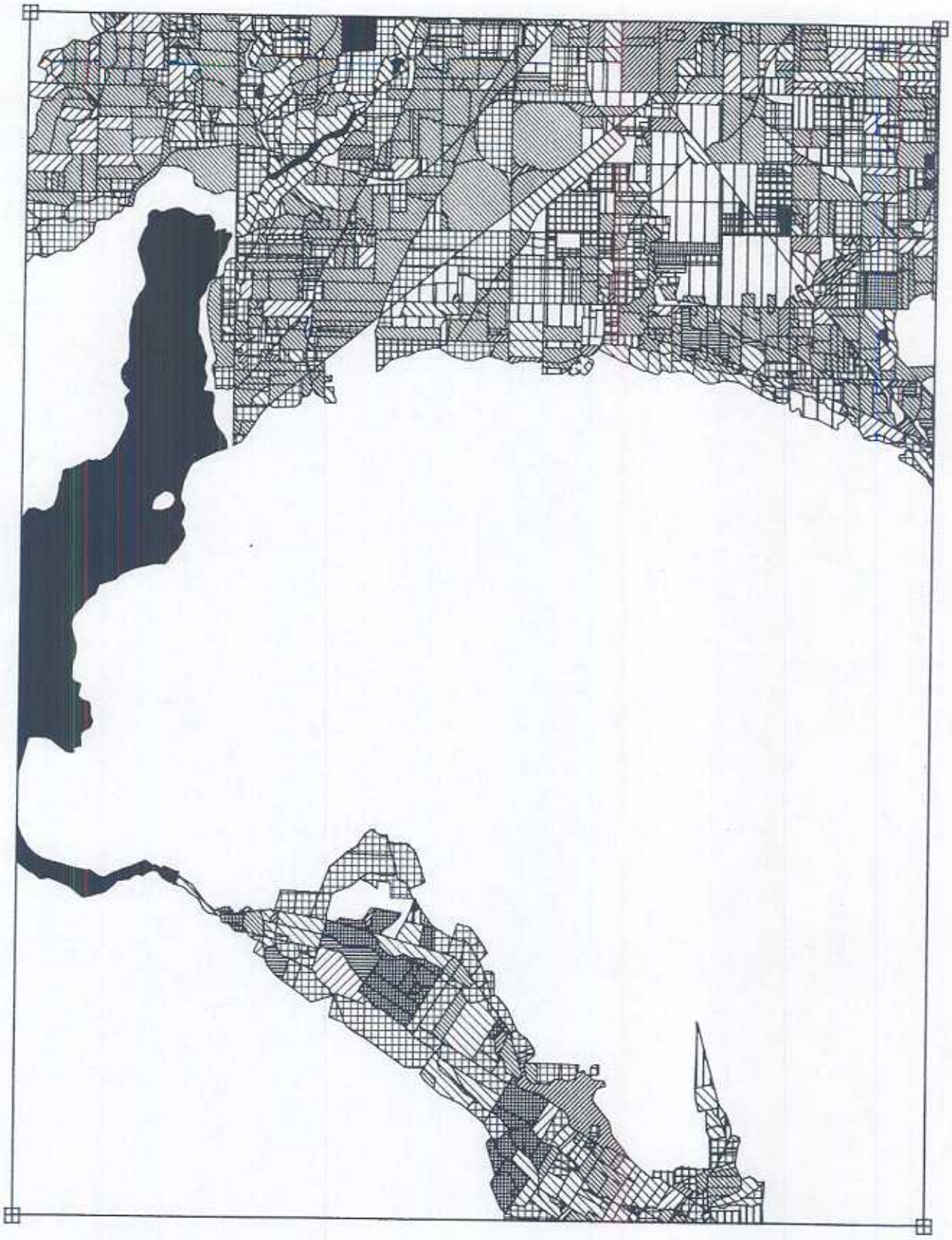


Figure 28. Final computer-generated map of the Charleston 7-1/2 minute quadrangle.

LAND USE CATEGORIES

During the division's years of collecting water-related land use data, land use categories and map codes have varied from inventory to inventory.

In late 1984, at the beginning of the division's new phase of mapping water-related land use, an Active Mappers Committee was formed. The committee reviewed all ongoing mapping efforts in the state and then focused on the issue of coordinating and standardizing map data. A summary of the committee's work is given in Appendix B. The division is committed to using the *1988 Standard Cover Types and Codes List* developed from this committee. Codes from this standard cover type list, with descriptive information, are shown in Table 1.

As each water-related land use inventory for the state is completed and, also, when some areas are re-inventoried, it is useful in some instances to tabulate and compare inventories and respective changes. Because of the different names of cover type and codes that were used earlier to the *1988 Standard Cover Types and Codes List*, it becomes necessary that earlier names of cover types and codes should be provided in this report. Table 4 shows the codes from earlier studies that relate to the standard cover types. Appendix C lists the previous land use studies conducted by the division.

Table 4. List of cover types and land use codes (standardized in 1988) for the State of Utah with the state code and comparisons of the 1988 standard code and cover type to previous land use inventories.

STATE CODE	COVER TYPES (Standardized in 1988)	UTAH LK. (66)[a] BEAR R. (69) WEBER R. (70)	UINTAH (67) W. COLO. (67) VIRGIN R.(78) UINTA B. (80)	SALT LAKE COUNTY (82)	U. SEVIER (81) M. SEVIER (83) L. SEVIER (85) BEAR R. (86) WEBER R. (87)
I	Cropland	-[b]	-	-	*[c]
IA	Irrigated	A[d]	A	-	*
IA1	Hort. & Specialty Crops	-	-	-	*
IA1a	Fruit	A8	A16	-	*
IA1a1	Cherry	-	-	-	*
IA1a2	Apple	-	-	-	*
IA1a3	Peach	-	-	-	*
IA1a4	Pear	-	-	-	*
IA1a5	Apricot	-	-	-	*
IA1a6	Other	-	-	-	*
IA1b	Nuts	-	-	-	*
IA1b1	Walnut	-	-	-	*
IA1b2	Pecan	-	-	-	*
IA1b3	Other	-	-	-	*
IA1c	Vineyard	-	-	-	*
IA1d	Bush Fruit	-	-	-	*
IA1e	Berries	-	-	-	*
IA1f	Nurseries	-	-	-	*
IA1g	Other	-	-	-	*
IA2	Row & Close-Grown Crops	-	-	-	*
IA2a	Grain	A4	-	Ag	*
IA2a1	Corn	A5	A1	-	*
IA2a2	Sorghum	-	-	-	*
IA2a3	Wheat	-	A9	-	*
IA2a4	Barley	-	A7	-	*
IA2a5	Oats	-	A8	-	*
IA2a6	Other	-	-	-	*
IA2b	Vegetables	-	-	-	*
IA2b1	Potatoes	A7	A3	-	*
IA2b2	Onions	-	-	-	*
IA2b3	Beans	A13	-	-	*
IA2b4	Tomatoes	A10	A5	-	*
IA2b5	Sweet Corn	-	-	-	*
IA2b6	Other	A6,A9,A11	A2,A4,A6	-	IA2b5[e]

[a] The data in parentheses (66) identifies the year the field checking was conducted for the various inventories.
[b] The dash (-) indicates that there was no corresponding cover type mapped for the above inventories.
[c] The asterisk (*) indicates that the cover type for the above inventories is the same as the 1988 standard cover types.
[d] The use of a code, such as the (A) footnoted, indicates that the code used for the above inventory corresponds to the 1988 standard cover types.
[e] The codes that appear in this column are those that are different than the 1988 standard code.

Table 4. Continued.

STATE CODE	COVER TYPES (Standardized in 1988)	UTAH LAKE (66)[1] BEAR R. (69) WEBER R. (70)	UINTAH (67) W. COLO. (67) VIRGIN R.(78) UINTA B. (80)	SALT LAKE COUNTY (82)	U. SEVIER (81) M. SEVIER (83) L. SEVIER (85) BEAR R. (86) WEBER R. (87)
IA3	Forage Crops	-	-	A	*
IA3a	Alfalfa	A1	A10	-	*
IA3b	Grass Hay	A3	A12	-	*
IA3c	Grass/Turf	-	-	-	IA3e
IA3d	Pasture	A2	A13	-	*
IA3e	Other	-	A11	-	IA3c
IA4	Other	-	A18	Ai	*
IA4a	Fallow Plowed	-	-	-	*
IA4b	Idle (Overgrown)	A12	A17	-	*
IB	Non-Irrigated	E	B	D	*
IB1	Row & Close-Grown Crops	-	-	-	*
IB1a	Grain (Beans, Seeds)	E1	-	-	*
IB1a1	Wheat	-	B2	-	*
IB1a2	Other Grains	-	B3	-	*
IB1a3	Dry Beans	-	B4	-	*
IB1a4	Safflower	-	-	-	*
IB2	Hayland Crops	-	-	-	*
IB2a	Alfalfa	E2	B1	-	*
IB2b	Pasture	E3	B5	-	*
IB2c	Other	E5	-	-	*
IB3	Other (Plowed)	-	B7	-	*
IB3a	Fallow	E4	B6	Df	*

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Table 4. Continued.

STATE CODE	COVER TYPES (Standardized in 1988)	UTAH LAKE (66)[1] BEAR R. (69) WEBER R. (70)	UINTAH (67) W. COLO. (67) VIRGIN R.(78) UINTA B. (80)	SALT LAKE COUNTY (82)	U. SEVIER (81) M. SEVIER (83) L. SEVIER (85) BEAR R. (86) WEBER R. (87)
II	Meadow/Wetlands/Open Water	C	D,F	-	*
IIA	Grassy Aspect	-	-	-	*
IIA1	Irrigated	-	-	-	*
IIA1a	Pasture	-	A14	-	IIA1a1,2a1
IIA1b	Hayland	-	A15	-	IIA1a2,2a2
IIA2	Non-Irrigated	-	-	-	*
IIA2a	Pasture	C4	8,F8	Ws	IIA1b1,2b1
IIA2b	Hayland	-	-	-	IIA1b2,1b2
IIA2c	Non-Agricultural Use	-	-	-	IIA1b3,2b3
IIB	Cattail/Bullrush	C1	F4	Wc	*
IIC	Wet Flats (barren)	-	-	M	*
IID	Shrub Aspect	C5	F2	-	*
IIE	Riparian	C2	-	Wr	*
IIE1	Forested Aspect	-	F1	-	*
IIE2	Shrub Aspect	C3	3,5,6,7,9	-	*
IIF	Open Water	B	E	-	*
IIF1	Streams	-	-	-	*
IIF2	Reservoirs	-	E1,E2	-	*
IIF3	Ponds/Lakes	-	E4	-	*
IIF4	Other	-	E3	-	*
IIF4a	Temporarily Flooded	-	-	-	*
IIF4b	Sewage Lagoon	-	-	-	*
IIF4c	Evaporation Pond	-	-	S	IIFAC,VC2

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III	Range & Forest Land	-	-	-	*
IIIA	Alpine Plants	-	-	-	*
IIIB	Conifer	-	-	Uc	*
IIIB1	Douglas/White Fur	-	-	-	*
IIIB2	Ponderosa	-	-	-	*
IIIB3	Fir/Spruce	-	-	-	*
IIIB4	Lodgepole Pine	-	-	-	*
IIIB5	Pinyon-Juniper	-	-	-	*
IIIB6	Etc.	-	-	-	*
IIIC	Deciduous	-	-	Ud	*
IIIC1	Aspen	-	-	-	*
IIIC2	Mountain Brush	-	-	-	*
IIIC3	Etc.	-	-	-	*
IIID	Grass Aspect	-	-	-	*
IIID1	Dry Pasture	-	-	-	*
IIID2	Native Grasses	-	-	Ug	*
IIID3	Etc.	-	-	-	*
IIIE	Shrub Aspect	-	-	-	*
IIIE1	Northern Desert Shrub	-	-	Um	*
IIIE1a	Sagebrush	-	-	-	*
IIIE1b	Etc.	-	-	-	*
IIIE2	Southern Desert Shrub	-	-	-	*
IIIE2a	Creosote Bush	-	-	-	*
IIIE2b	Etc.	-	-	-	*
IIIE3	Salt Desert Shrub	-	-	-	*
IIIE3a	Shadescale	-	-	-	*
IIIE3b	Greasewood	-	-	-	*
IIIE3c	Saltbrush	-	-	-	*
IIIE3d	Desert Molley	-	-	-	*
IIIE3e	Etc.	-	-	-	*

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IV	Barren Lands	-	-	-	*
IVA	Bare Soil/Sand	-	-	-	*
IVA1	Dry Salt Flats	-	-	-	*
IVA2	Beaches	-	-	-	*
IVA3	Other Sandy Areas	-	-	-	*
IVA4	Other	-	-	-	*
IVB	Rock Outcrop	-	-	Ur	*
IVC	Excavated Land	-	-	E	*
IVD	Other	-	-	-	*
V	Built-Up Land	D	C	-	*
VA	Farmstead	-	-	-	*
VA1	Builds/Homes	-	C1,C5	-	*
VA2	Open Spaces	-	C4	-	*
VB	Residential	-	-	-	*
VB1	High Density	-	C3	Rt,R	VB1,VB2,VB6a
VB2	Low Density	-	-	R1	VB3
VB3	Open Spaces	-	C2	L	VB4
VB4	Idle	-	-	-	*
VC	Commercial/Industrial	F	D	C	*
VC1	Commercial	-	-	-	*
VC2	Industrial	-	-	-	VC4
VC3	Open Spaces	-	-	X	*
VD	Transportation & Utilities	-	-	D	VD,VE
VE	Other	-	-	-	*

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APPENDIXES

APPENDIX A

Hydrologic Inventories

Utah Lake Drainage Area. In cooperation with Utah State University. November 1969. 136 pages - includes substantial climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, geology, economy, history, and physiography.

Uintah Study Unit. In cooperation with Utah State University. March 1970. 181 pages - includes substantial climatic, streamflow, and groundwater data, detailed water budgets, and more general information on topography, geology, arable lands, history, economy, water quality and water development and management. (out of print, file copy only)

Weber River Study Unit. In cooperation with Utah State University. August 1970 - includes substantial climatic, streamflow and groundwater data, detailed water budgets, and more general information on topography, geology, economy, and water quality.

Great Salt Lake Desert Area. In cooperation with Utah State University. November 1971. 70 pages - includes substantial climatic and water resources data, water budget for Tooele Valley, and more general information on physiography, economy, geology, and water management aspects.

Bear River Study Unit. In cooperation with Utah State University. February 1973. 126 pages - includes substantial climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Price River Study Unit. June 1975. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Escalante River Study Unit. December 1976. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Dirty Devil River Study Unit. January 1977. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

San Rafael River Study Unit. January 1977. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Update of the Price River Study Unit. June 1978. Includes updated climatic, streamflow, and water use data and detailed water budgets.

Update of the San Rafael River Study Unit. December 1979. Includes updated climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Virgin and Kanab Study Units (Utah's Lower Colorado River Area). February 1983. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Hydrologic Inventory of Colorado, Dolores, and San Juan Study Units. September 1987. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology and economy.

Hydrologic Inventory of the Sevier River Basin. January 1991. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology and economy.

APPENDIX B

In late 1984 at the beginning of Division of Water Resource's new phase of mapping water-related land use, an Active Mappers Committee was formed. The Division of Water Resources, Department of Natural Resource and The Division of Agriculture Development and Conservation, Department of Agriculture co-chaired this committee. Lloyd Austin, Division of Water Resources and Jim Christensen, Department of Agriculture filled these roles. Member agencies were:

Automated Geographic Reference
Bureau of Land Management
Bureau of Reclamation
Center of Remote Sensing, University of Utah
Dept of Transportation
Dept of Agriculture
Dept of Natural Resource
Dept of Health - Water Pollution
Div of Water Resources
Div of Water Rights
Div of Wildlife Resource
Soil Conservation Service
State Lands and Forestry
Utah Geological and Mineral Survey
U.S. Fish and Wildlife
U.S. Forest Service/Ogden
U.S. Forest Service
U.S. Geological Service
Utah State University-Extension Service

The committee surveyed all ongoing mapping efforts and then focused on the issue of coordinating and standardizing map data. The relationships between several state agencies and the AGRC program of the Office of Planning and Budget were also clarified. Three specific products came from this committee's work. The first was a standardized definition of a base resource data map file as follows:

Layers of Data	Level of Detail
Infrastructure & Base	Map Quad Sheet (USGS Topo) 1:24,000 scale
Ownership	Federal/State/Private, input 1:250,000 scale
Soils	Level 3 definition with preferred input of 1:24,000 scale
Land Cover	Use standard legend and set preferred input 1:24,000 scale
Climate	Precipitation/Temperature 1:250,000 input scale

Secondly, a standard legend for a cover map was developed and agreed upon which allows a hierarchy of data entry. This is shown as Table 1. The headings which are marked with an asterisk were minimum required for the base data set. Individual agencies could use finer breakdowns as needed for their specific programs.

The Division of Water Resources used only certain categories in the Jordan River Basin mapping which were considered necessary for water use budgets being prepared. All range land and forest land categories were left off while some categories were subdivided further than required by the base data set standards.

The third agreement reached by the committee was the use of a standard set of watershed units for the state. It was agreed that the maps developed by the United States Geological Survey working with National Water Resources Council would serve as the base standard. Individual agencies could then further subdivide these larger units for specific study purposes. This proposal was also presented to the Resource Development Coordinating Committee during the year 1986 and ratified.

APPENDIX C

Water-Related Land Use Studies

Utah Lake Drainage Area. In cooperation with Utah State University. February 1968 - detailed water-related land use tables and maps.

Bear River Drainage Area. In cooperation with Utah State University. April 1969 - detailed water-related land use tables and maps.

Weber River Drainage Area. In cooperation with Utah State University. February 1970 - detailed water-related land use tables and maps.

Uinta Hydrologic Area. Staff Report No. 7. September 1971 - detailed water-related land use tables and maps.

West Colorado Hydrologic Area. Staff Report No. 8. January 1972 - detailed water-related land use tables and maps.

Uintah Basin. In cooperation with U.S. Soil Conservation Services and National Aeronautics and Space Administration. 1980. Contains detailed water-related land use maps and tables. Investigates the use of landsat data concurrently with the high altitude color infrared photography to update the changing patterns of land use. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 109 pages plus maps.

Sevier River Basin (Upper Portion), 1981. Contains detailed water-related land use maps and tables. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 27 pages plus maps.

Sevier River Basin (Lower Portion), 1985. Contains detailed water-related land use maps and tables.

Salt Lake County, 1982. Contains detailed water related land use maps and tables. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 24 pages plus maps.

Sevier River Basin (Middle Portion), 1984. Contains detailed water-related land use maps and tables. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 34 pages plus maps.

Virgin River Area, 1989. Contains detailed water-related land use maps and tables. Performed in cooperation with USDA Soil Conservation Service, St. George, Utah office and Utah Division of Water Rights, Cedar City Area Office. 56 pages plus maps.

Bear River Basin, 1991. Contains detailed water-related land use maps and tables. Performed in cooperation with Utah Division of Water Rights. 50 pages plus maps.

Columbia River Basin (Utah portion), 1991. Contains detailed water-related land use maps and tables. 46 pages plus maps.

Southeast Colorado Basin (Utah Portion), 1991. Contains detailed water-related land use maps and tables. 57 pages plus maps.

Sevier River Basin, 1992. Contains detailed water-related land use maps and tables. 136 pages plus maps.

Weber River Area, 1992. Contains detailed water-related land use maps and tables. 56 pages plus maps.

Kanab Creek/Virgin River Study Units, 1992. Contains detailed water-related land use maps and tables. 58 pages plus maps.

Cedar/Beaver Study Unit, 1993. Contains detailed water-related land use maps and tables. 46 pages plus maps.